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THE FOUNDRY

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The Pullman Foundries.

JOHN T. BRAMHALL.

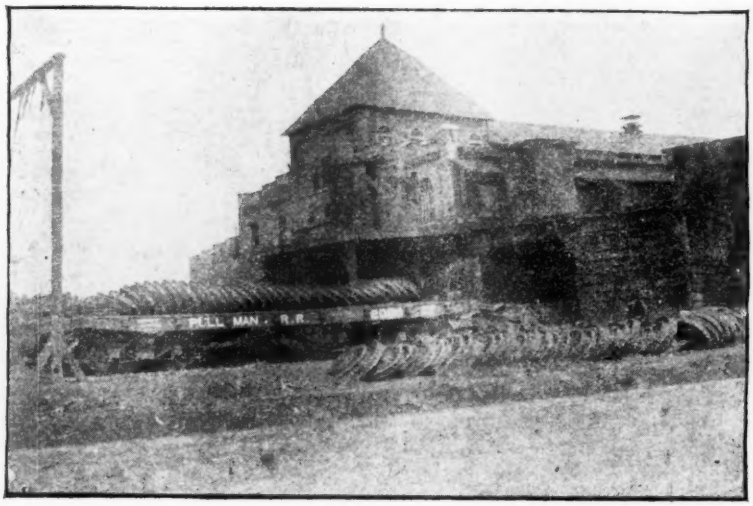
LIKE everything else in and about Chicago, the Pullman foundry plant is said to be the largest in the United States. Be this as it may, it is at all events a respectably extensive and complete establishment and worthy a careful inspection on this account, apart from its being a portion of the now notorious Pullman Palace Car Works. It should be stated, however, to begin with, that the Union Foundry and Car Wheel Works are a separate corporation, as is also the Pullman Iron and Steel Co. (the rail mill), although they are practically a portion of the Pullman works, Mr. Pullman being president of the former company and Mr. Runnells, the Pullman counsel, being president of the latter. The rolling mill started up on the 27th of August with about 175 men, chiefly the old employees. It covers an area of about 140'x160', and its capacity is some 15 tons per day. There are eight engines for various purposes, aggregating about 1,000 h. p., and three bar mills, consisting of 8", 10" and 18" trains respectively, and the output consists of rails and other forms of flat and T iron as the market may demand. The wages of the men are said to average $2.50 per day, according to the scale, but the great trouble has been lack of work.

The foundry is situated at the extreme north end of the Pullman works and consists of a long brick building some 600'x100', in which are the brass foundry, soft foundry and wheel foundry, and another similar building connected by an L, in which are the various shops for finishing the work turned out in the foundry. Work was resumed on August 15, after thirteen weeks' idleness occasioned by the strike, and by September 1 there were employed about 500 men, principally old hands. It should be stated that, properly speaking, there was no strike in the Pullman foundry or rolling mills, except such as grew out of and was in a manner necessitated by the strike in the car works.

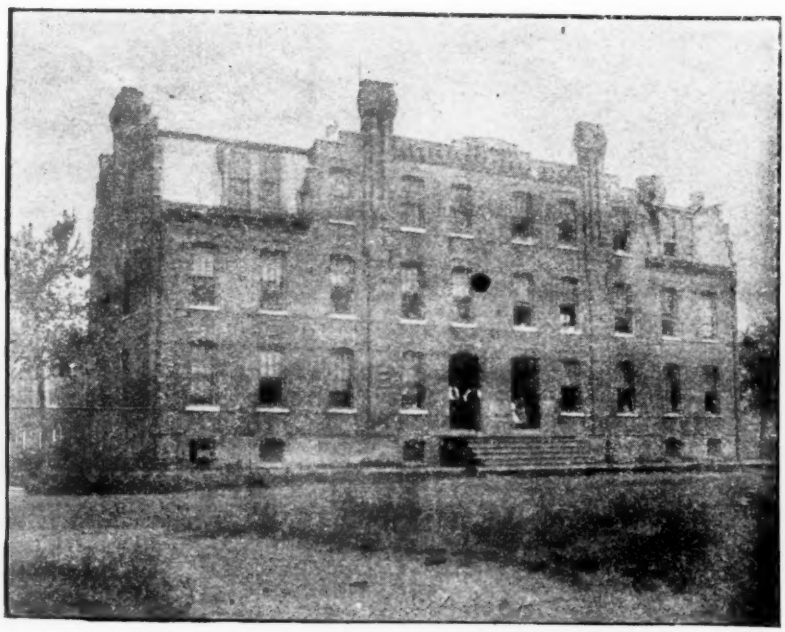
The capacity of the foundry is about 300 car wheels and some 50 or 60 tons of soft cast-

View of Union Foundry and Pullman Car Wheel Works, Pullman, Ill.

Tech 55



Pullman: View of Wheel Foundry.



Pullman: Where foundrymen live, tenants block, north end, 12 families. One water apparatus for each two sets of apartments, a flat measuring 14 x 32.

3 room flats, 2nd floor, $8.50, plus 60 cents.
4 " " 9.50, " 60 "

3 room flats, 3rd floor, $8.00, plus 60 cents.
4 " " 8.50, " 60 "

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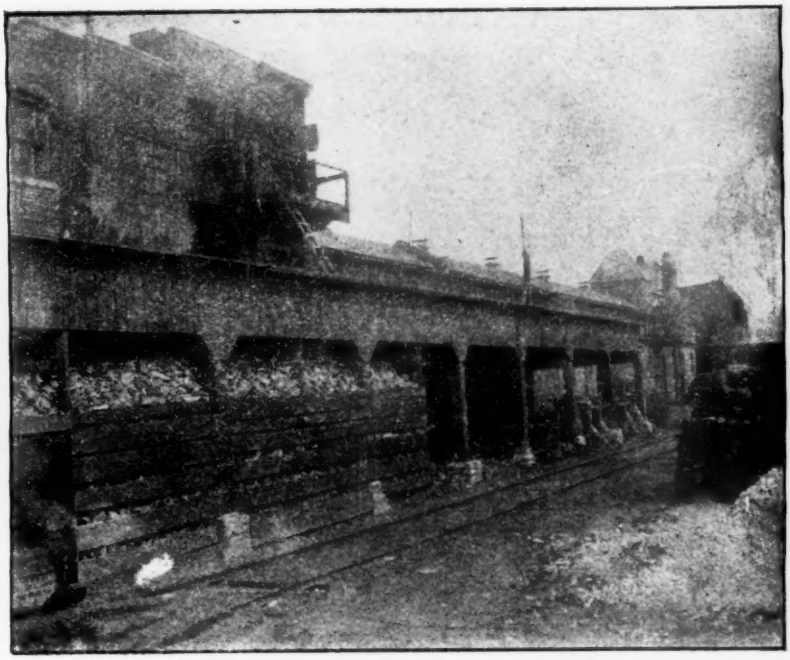
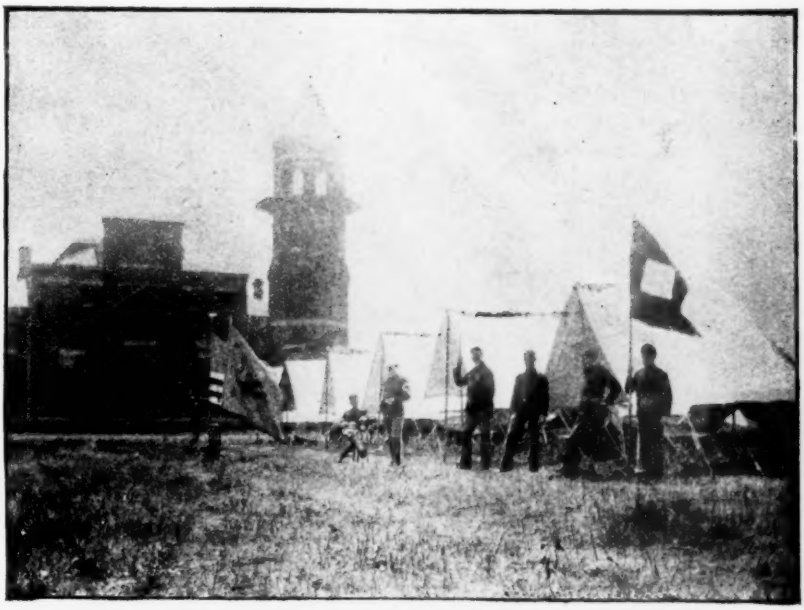


Pullman Foundry and Coke Bins, from east side.



Pullman, July. Camp of 1st Illinois National Guard, Signal Corps and Headquarters Chicago. Drop forge and foundry in the background.

ings per day. The brass foundry is equipped with a furnace of 25 pots and has a capacity of a couple of tons a day. All the brass work used in the construction of the Pullman cars and considerable in addition on contract is made here, and the annual output is steadily increasing. Experiments have been made with bronze and with aluminum, but have not been successful.

In the soft foundry, ten machines are in use for casting brake shoes, draw bars, etc. The sand is carried from the riddle by an ordinary bucket carrier to an endless belt which delivers it to the hopper shown in the cut. But little tamping is necessary in the box, the pneumatic plunger ramming the sand down in place at one movement of the lever. The machine is then swung around and while one flask is removed, the other is taking sand.

As to wages, they are stated by the management to range from $2.10 to $2.75 per 10-hour day for molders. A great deal of the work is piece work, and on this, many good men of the 21-cent class make $2.10 and $2.65 per day, and others even more, making the average of all employees in the iron department $2.22 per day. Brass molders receive from 21 cents to 27½ cents per hour, the majority averaging 25 cents, or $2.50 per day.

In considering the subject of wages, it is the annual earnings which a workman is enabled to make, and not the rate of daily wages which should be taken as a basis. A man may be paid a "rate" of wages which may appear in a tabulated statement as the highest anywhere paid, and at the same time the shop management may be such that he will scarcely earn enough to keep body and soul together. This has been the difficulty at Pullman. By the census of 1880 it appears that $3,644,000 were paid out in wages in the census year. Making allowances for boys, it would appear that the 7,377 men earned an average of $487 per annum, or $1.57 for each working day. The brass workers earned less instead of more. It would be interesting in this connection to know the annual earnings of the foundrymen at Pullman, and I regret that these figures are not within my reach.

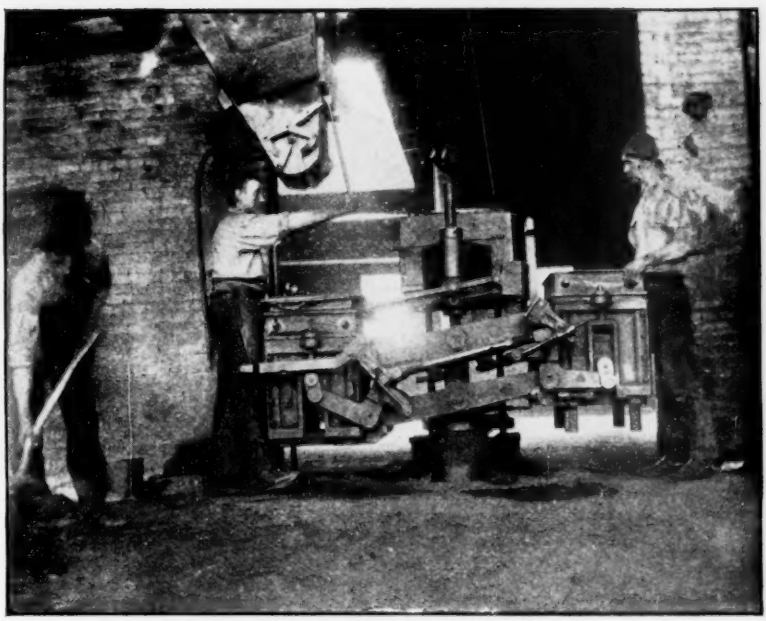
I saw and talked, however, with a man who had formerly worked in the wheel foundry, and as he was hoping for re-employment I will not give his name. I asked him about the wages. He "had no fault to find with the wages," he replied guardedly. The wages were good enough. They got 30 cents per wheel, and paid the helper 10 cents. Before the cut they got 35 cents. They could make 20 to 23 wheels a day and at 20 cents that was good enough pay." Something in the man's hopeless tone of voice, however, belied his words, and I read a story of suffering in his sunken cheeks. "How much can you make, or could you make," I asked, "in a year?" "Twenty-eight days we made last year," he replied, and I could see no reason for his telling me an untruth. "From the 24th of May, 1893," he repeated slowly, "till now, we had just twenty-eight days' work." "How did you support yourself?" I asked. "Oh, I got odd jobs here and there, did what I could and my wife got work." He lived in a four room flat in a row of brick "cottages," for which he was expected to pay $14 per month rent, and water rate of 71 cents. There were evidences of taste shown in tidies and knicknacks, and I understood without question, his reluctance to take one of the squalid apartments in the tenement blocks, even though he was way behind in his rent. He had hung on week after week and month after month, expecting work and better times. I cannot blame him.

I do not like to see an intelligent American workingman accept a lower condition of life than that which he has been occupying. It is not comparable to a business man's reverse. That can be mended. He is as much his own master on an income of $1,000 a year as he was with $25,000. But a workingman's wages are his rating, too often, for life. When the skilled mechanic accepts a reduction in pay, which is not expressly stipulated to be temporary, and restricts himself and his family in the comforts which formerly he has been able to provide out of the earnings of his labor, he is just so much less a free man and so much nearer the condition of hind and serf. The picture of this hollow-cheeked molder, whose tally of work for the year (up to the strike) amounts to but 28 days, behind in his rent and supported by the earnings of his wife, will haunt me many a day, with scores of other hungry, sad-eyed victims of a system which, while pretending to pay good wages, gives in reality, starvation.

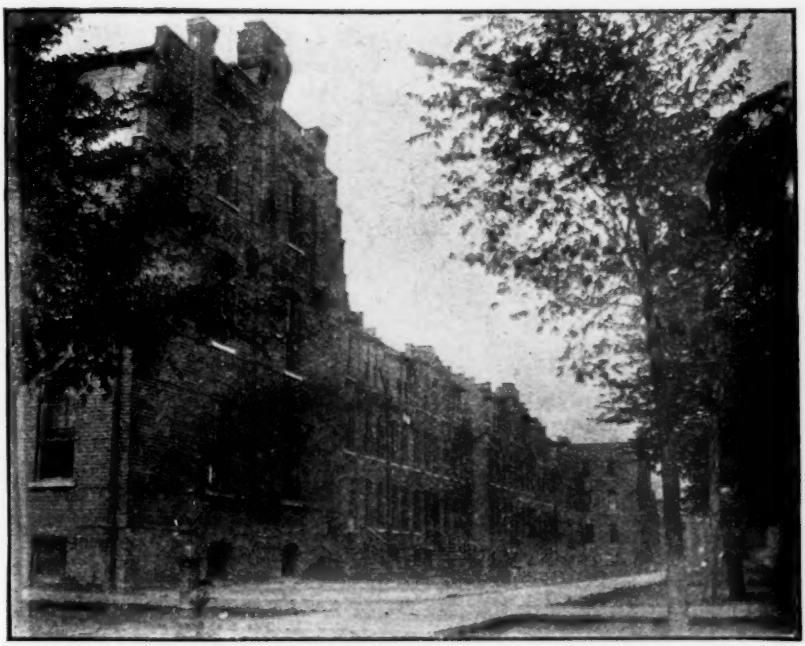
And that reminds me of some of the hungry people Nelly Bly found in Pullman, and it wasn't in the worst of the hungry times that she was there either.

"We have not been as hungry since the strike as we were when I was working," said a man in one of the model tenements.

"Were you a newcomer?" asked Miss Bly.



Pullman: Molding Machine in the Foundry.



Pullman: Where fonndrymen live. End of block and row of cottages. Single houses, 14 x 35, 5 rooms $17 00, plus 71 cents. Some of the houses are about 16 feet wide and divided into two flats of four [4] rooms each, $12.00, plus 61 cents.

"No, I have been here almost from the first. I used to get big wages and I lived in a big house ('little' house, Miss Bly meant; there are no big houses for workmen in Pullman, except the tenements). But even then I could not save much, for you see I had a large family."

"What work did you do?" she asked.

"I worked in the foundry," he replied. "We have been reduced from $2.75 to $1.60 per day since last August. For months we had no work and I lived upon the little I had saved, but of course, I couldn't stand the high rents, and I've come down to four small rooms on the second floor of this tenement. I pay $9.60 a month for the rooms." (I must make another correction: the $9.60 "flats," including water rate, are three rooms, not four, and measure scant 30x15 feet.)

I will quote in this connection a passage from the book on Pullman, by the Rev. Wm. H. Carwardine, the Pullman preacher who had the courage to stand by his people during the recent strike, and to point to George M. Pullman as the man responsible for all the suffering and misery that has been caused in the "model town" in this year 1894.

"Among the molders, the brass molders have been cut from 20 to 25 cents per day, and the laborers and furnace men 20 cents. The brass finishers lost from 25 to 50 cents a day. The molders in the wheel shop were cut 5 cents a wheel, amounting to $1 and $1.20 per day, while the helpers have 50 cents a day less, and the laborers 10 to 35 cents. In the last year the men in this department have been given only 28 days actual employment. The machine department men were reduced 25 cents a day. The iron foundry men who do piece work were reduced from 40 to 75 cents for ten hours work, the day workmen 40 cents, coremakers from 20 to 80 cents, men in the chipping room 20 to 75 cents, and the yardmen 20 cents."

"Well," says Gradgrind, "what are you going to do about it? We must stick to the rule of business, that the aggregate cost of a piece of work must not exceed its selling price." Very good; but suppose the man makes a rule that the selling price shall not be less than the cost of its production, including in that cost, the decent way of living that an American workingman should demand as a right?

I have no desire to "roast" Pullman, but on the other hand, I have no confidence in the pleas for reduction of labor and for the exaction of ruinous rents and charges by the president of a company which not only paid its 8 per cent. dividend in 1893 (and 1894), but earned enough in addition to pay an extra dividend of 10 per cent.; a company which Senator Sherman denounces along with the sugar trust, as one of the most outrageous monopolies of the day.

A Cheap Black Wash for Molds.

OWEN RICE.

FOUNDRYMEN who are using leads and washes of various kinds for their cores and heavy classes of skin and dry sand castings can affect quite an economy in the cost of the same by using the following wash, provided they are not particular about the surface of the casting being blue:

To two buckets of talc or soapstone add three large handfuls of starch or flour, and water sufficient to make it the thickness of dough. Then thin it with water when about to use, the same consistency as other blacking. The point of too much water in thinning will be indicated by the mixture foaming. This mixture has been used on the heaviest class of work produced by the Bates Machine Co., of Joliet, Ill., and has always given satisfaction. It peelsthe castings perfectly, there being no such thing as the sand sticking to it when this wash is used. It also lays well to the mold and does not wash from the iron striking it.

Core Compound.

ON another page of this issue the advertisement of W. H. Stewart, 182 Front street, N. Y., will be found. He has recently brought out something new in the way of a core compound, which is valuable on a general run of cores for machinery, but particularly on cores that are nearly surrounded by metal in which the least possible amount of gas producing material is desirable. No blacking is necessary on cores made of it, as the hole is bright and the sand runs out of it freely when cleaning the casting. When made from this compound they do not absorb dampness, and consequently cannot cause blow holes from that source. Samples of it are sent on application.

Steiger & Kerr Occidental Foundry Co., San Francisco, Cal., say: "We feel that your journal gives full value for the money we expend upon it;" so do all the rest of our subscribers

Manufacture of Steel Castings.

JAMES LARKIN.

A LARGE number of so-called steel castings are nothing more than malleable iron. The best of these castings are made from superior white pig, as low in silicon and phosphorus as possible. They are made in the same manner as ordinary iron castings, except that the metal having so little silicon chills much quicker than ordinary No. 1 foundry iron, and the liability to shrinkage cracks renders it necessary to put large "rising heads" on the castings. The castings after cooling are very hard, and almost as brittle as glass, and are, or should be preferably, perfectly white throughout. They are then annealed in ore or scale, to which a little sal ammoniac has been added. This latter operation, which requires about two weeks, produces on the entire surface of the casting a coating of malleable iron about 1-16 of an inch thick, and renders the inside sufficiently soft to be tooled without any difficulty. For small castings such a metal is admirably adapted, but castings several inches thick made in this way are only slightly superior to good pig iron in having, perhaps, a little greater tensile strength.

Crucible steel castings are a failure and always will be. By this statement it is not meant to say that it is impossible to make such castings satisfactory. But with the single exception of a particular class of work where hardness and ultimate strength are alone desired—for which requirements they are well adapted—there are always a number of disturbing elements that will eventually result in the total disuse of crucible castings. The value of small steel castings depends on the possession of qualities that render them equal or superior to forgings. When it is attempted to make a steel with the requisite qualities the troubles begin. First, in order to get such a steel, muck bar must be used almost exclusively. This, as everyone knows, is very difficult to melt in a crucible furnace, and after melting it is almost impossible to pour it, as the metal chills before the pots can be emptied. If, however, after unusual exertions, a successful cast be made, the castings are found to be full of blow holes. There are two means employed to remedy the latter defect: first, by the use of ferro-silicon, and second by making a steel higher in carbon and therefore more fusible. When sufficient ferro-silicon is added to give from 0.5 to 1.0 of silicon in the steel, the metal is not difficult to melt, but the resulting castings, while soft and solid, have lost all their ductility, and are simply a superior form of pig iron, with a tensile strength of about 50,000 lbs. If, on the other hand, the pots are charged with stock higher in carbon and only a small percentage of ferro-silicon is added, the castings are solid, but are brittle, and so hard as to be difficult to tool. Their hardness is extremely objectionable to machinists, but their brittleness is a still greater evil, and precludes the possibility of their replacing forgings. It has been attempted to overcome the latter difficulty by annealing, and by this means a really superior crucible casting can be made. But the additional cost of production is greater than consumers are willing to pay for the castings.

Bessemer steel castings. The Bessemer process in the manufacture of steel castings is as yet open to the objection of making a less homogeneous and a harder metal than the open hearth. Some time ago a number of large Bessemer steel cranks, weighing from 7,000 to 8,000 lbs. each, broke in half when it was attempted to shrink them on the shafts for which they were intended. Notwithstanding these failures, it is believed that in the near future all steel castings will be made by the Bessemer or an equivalent pneumatic process.

Open-hearth steel castings. This method can be relied upon to make a very large class of important castings with entire success. According to Mr. Alexander L. Holley, the operation consists:

"1. In the formation of an initial bath of manganiferous pig to prevent oxidation during the process.

"2. In dissolving such softening or decarbonizing materials as wrought iron in this bath.

"3. In the addition, at the end of the operation, of silicon and manganese in such order and proportion as to prevent the formation of blow holes while casting, and at the same time to give to the steel certain special physical qualities.

"Another very important feature of the process is the method of taking tests. We will now describe in detail the different stages of the operation, and we will suppose at first, so as to avoid confusion, that the metal to be produced is of the harder kind.

"THE FURNACE.—The object of greatest importance during the whole of the operation is to keep oxidation as low as possible in the bath. For this reason the furnace must, indeed, be kept as hot as possible, with a good solid body of flame; but there should be only just enough air admitted to promote thorough combustion.

"THE INITIAL BATH.—This must be made of pig iron containing from 6 to 9 per cent. of manganese. Spiegeleisen is probably the most convenient form of pig; but as spiegel with this percentage may not be at hand at all times, the bath may be formed by taking a richer spiegel, say 12 or 14 per cent. manganese, and diluting it with one-half ordinary pig containing no manganese.

"The weight of the initial bath, in proportion to that of the whole charge, varies according to the conditions under which the heat is made. We may say, generally, that 11 per cent. of the whole is an average quantity. Every open-hearth melter knows that it is impossible to determine in advance the exact quantity of pig wanted for the operation. The temperature of the furnace has much to do with it. The nature of the refining material has also a great influence. If a specially pure product is required and the softening materials used are very fine puddled blooms, nearly free from carbon and manganese, the initial bath must necessarily be larger, as well as richer in manganese; it may in this case reach 14 per cent. of the whole charge. The materials for the initial bath are always charged cold.

"THE SOFTENING OR REFINING MATERIALS.—Soon after the bath is completely melted, the refining materials are successively added in small lots of about 450 lbs. each. These are invariably preheated, as charging them cold and frequently would tend to keep down the temperature of the bath.

"The materials used in this second period of the operation are chosen with reference to the quality required in the finished product. They may be good Bessemer or open-hearth scrap, fountains from previous castings, puddled bars or direct blooms. Materials inferior to these would correspondingly lower the quality of the product. The proportion of refining materials to the whole charge averages 78 per cent.

"SLAG TESTS.—Spiegeleisen is used for the initial bath because the manganese it contains, being the most oxidizable of all the materials present, will remove oxygen that may be present in the bath and will intercept oxygen that tends to enter it. So that the more manganese there is in the slag, the less oxygen there will be in the metal below. Oxide of iron tends to make the slag black; manganese turns it light olive or ash-green, and the different tints between these two extremes give to the practiced eye an exact idea of the state of the oxidation of the bath.

"METAL TESTS BEFORE THE FINAL ADDITIONS.—The slag test gives no indication of the physical state of the metal, which is an equally important guide in the operation. When, therefore, the operator has reason to believe that the metal is approaching the point of sufficient softening or purification, he makes the following tests: A ladleful of metal is taken from the furnace and cast into a round ingot about 3 inches in diameter and $1\frac{1}{4}$ inches thick. The ingot is knocked out of the mold as soon as set, and flattened under a special steam hammer, at its original heat, into a disk about 7 inches in diameter and $\frac{3}{8}$ of an inch thick. From bending and fracturing these disks the operator can judge of the state of his metal with great nicety, and has at hand all the necessary elements to remedy any unfavorable tendency likely to develop during the operation.

"THE FINAL ADDITIONS.—These consist of a special pig containing both sil-

icon and manganese and also an additional quantity of manganese introduced in the shape of a 50 or 60 per cent. Mn ferro-manganese. A part of these ingredients is taken up by re-actions which prevent the formation of blow holes; the remainder is left in the metal to impart to it certain physical qualities. The usual charge consists of 11 per cent. of special pig, having the following composition:

Mn	3.50
C	3.00
Si	4.20 to 4.60
P	0.10

"The proportion of ferro-manganese used varies from 1 to 1.8 per cent. of the total charge.

"The special pig is charged hot. While it is melting a marked change takes place; the bath which up to that time had bubbled about as much as in the ordinary pig and scrap operation, becomes gradually more and more quiet until its surface is smooth and scarcely broken by small and widely scattered bubbles. When the special pig is nearly all melted, the ferro-manganese is thrown in hot. The bath is then rabbled vigorously for about a minute and casting takes place immediately."

The Standard Steel Casting Co., Thurlow, Pa., has found it possible to simplify many points in the above mentioned method, securing equally good results. None of the stock is pre-heated except the final additions, and the refining materials are charged at once.

The two principal difficulties that the steel foundryman has to contend with are blow holes and shrinkage.

Blow holes. It is commonly supposed that blow holes in castings are due to carbonic acid gas, disengaged during the operation of casting. This is only true to a very limited extent, especially where the steel contains 0.1 per cent. or more of silicon. Herein lies the cause of the many failures connected with the manufacture of steel castings. The manufacturers have been led to believe that it was only neoessary to add a few pounds of ferro-silicon to their steel, and presto! all their castings would be solid. Practical experience has proven the fallacy of this idea.

Blow holes in steel which has been properly melted, and to which has been added sufficient ferro-silicon, are almost entirely due to the high melting point of low-carbon steel, or rather to the rapidity with which the metal chills. This is proved by the fact that the lower ends of castings which have been fed from the bottom by means of a runner are always solid, while the blow holes, when such exist, are always on top.

The difficulty connected with blow holes has almost entirely been overcome by putting on top of the casting a rising head from 2 to 3 feet high. By this means 6,000-lb. steel rolls without a single blow hole or flaw of any kind have been made.

The long riser is effective in two ways: First, it carries from the casting proper the sluggish metal, which has been cooled in its passage through the mold, and allows the mold to be filled with hot fluid metal; and second, the ferrostatic pressure of a column of iron 3 feet high is equal to about 10 pounds to the square inch. This pressure has a tendency, of course, to force the metal into all the corners and make it solid. It also prevents, in a measure, shrinkage troubles, and appears to give to steel castings that solidity for which they are noted, giving them a density of 7.8, almost equal to that of a forging.

Shrinkage. This presents a difficult and troublesome problem which has not yet been fully solved. It is almost impossible to make certain large, thin, complicated castings of steel. Shrinkage troubles are caused by the immense contraction of cast steel, which frequently amounts to 5-16 of an inch per foot; and to the hard dry sand molds, which it is necessary to use in order to prevent the white-hot metal from destroying the mold.

There are five different ways of attempting to remedy this evil:

1. By changing the chemical constitution of the steel.
2. By stripping the castings as soon as poured.
3. By mechanical pressure.
4. By large rising heads.
5. By care in moulding.

Chemical constitution. A change in

the chemical constitution by increasing the manganese and diminishing the silicon will nearly always have the desired effect. This renders the metal more fluid, and lowers its melting point.

Stripping. A large number of castings can be saved from tearing apart or cracking when cooling by simply opening the flasks immediately after pouring and covering the casting with sand.

Mechanical pressure. Quite a number of difficult castings have been saved by means of mechanical pressure. For example, at one end of the flask, and immediately at the end of the molding, a small iron plate is placed. This plate is attached to a screw which can be turned from the outside of the flask. The arrangement is admirably adapted for castings large on both ends aud small in the middle.

Rising head. A large rising head prevents shrinkage cracks by the pressure it exerts, and by feeding the metal to points where shrinkage is taking place.

Molding. Many castings can be saved from shrinkage cracks by an intelligent molder. It would be useless to enter into details on this subject. Suffice it to say that every pattern is a study; and it is only by an intelligent application of the knowledge already gained, that it is possible now to make castings that a few months ago would have seemed ridiculous to attempt.

Shrinkage holes. Shrinkage holes in castings are exately similar to the phenomenon called "piping" in crucible steel. They are very troublesome and difficult to prevent, although they rarely affect the value of a casting, coming as they do in the center. They are caused, of course, by the metal chilling before the immense shrinkage occurs. Then when this contraction does take place on all sides, but away from the center, there is no more fluid metal to run into the sapce thus made vacant.

Necessity the Mother of Invention.

G. B. McDONALD, M. E., of the Jefferson Iron and Brass Foundry, Jefferson, Tex., writes under date of August 24, as follows:

"We have, owing to the scarcity and high price of coke, been compelled to melt our iron with a mixture of half coke and half charcoal which gives satisfactory results. In charging it, we place the charcoal in first with the coke on top, which we have found works the best, and is certainly satisfactory from an economical standpoint, as coke costs about $10 per ton here."

We have never heard of this method of overcoming a difficulty before, and think a great deal of credit is due Mr. McDonald. We have had evidence that the scarcity of coke has been the means of causing a great many foundrymen to depart from the established practice of using coke altogether by resorting to the use of hard and soft coal. As to the adaptability of the latter for use in cupolas a variety of opinions exist, and we expect to have data from parties at present using it that will lead eventually to something decisive in regard to its utility.

The Use of Silicon in Copper.

FRED J. DAVIS.

IN this country, silicon either as a flux for copper in making pure copper castings, or in making silicon bronze, is almost unknown and but little used, although in Europe it is employed for both these purposes quite extensively.

Silicon is the metallic base of ordinary sandstone or white sand. Pure silicon is a very light metal, a little lighter than aluminum, the specific gravity of silicon is 2.49, that of aluminum being 2.56.

Pure silicon, however, is not made commercially, it having been produced only in very small quantities. In an alloy with copper it is produced in large quantities by the Cowles Electric Smelting and Aluminum Co., in their electric furnaces at Lockport, N. Y. In making this alloy the furnace is charged with a mixture of sandstone, granulated lake copper and carbon, a current of 5,000 amperes is passed through this charge for about two hours, the electrodes used are of carbon, each 8 inches in diameter and 50 inches long. After allowing the

furnace to cool, the metal in the shape of a rough pig is taken out or sometimes tapped out while the metal is still liquid. The metal as it comes from the electric furnace contains from 15% to 25% of silicon, the balance being copper. This alloy is very brittle, its color is white with a bluish cast. Several of these runs or pigs are then melted together in a reverberatory furnace, mixed, cast into ingots, and a chemical analysis made of the batch to determine the percentage of silicon contained. It is marked in this shape or, by the addition of copper, reduced to a 10% alloy, the price depending on the percentage of contained silicon. With either the 10% alloy or the richer alloy, any desired grade of silicon bronze can be made in the brass foundry by simply adding enough copper to reduce the silicon to the required percentage and melting and mixing in an ordinary crucible. The most useful of these alloys contain from 1% to 5% of silicon. A 3% silicon bronze—97% copper, 3% silicon—has a tensile strength in a casting of from 50,000 to 55,000 lbs. per square inch, with from 50% to 60% ductility. It is a good casting metal and is valuable where a strong, and still very ductile metal is required. Five per cent silicon bronze—95% copper, 5% silicon—has a tensile strength of from 70,000 to 80,000 lbs per square inch, with about 8% ductility. It is a fine and close grained metal and casts well. An alloy containing more than 5% of silicon is too brittle to be useful for castings.

Every foundryman knows the difficulties attending the casting of pure copper successfully. The addition of only .1 of 1% of silicon to the melted copper before pouring will make the copper more fluid, remove the copper oxide and make the castings clean, solid and entirely free from blow holes. The occluded gases given up by the oxide always present in melted copper is what causes the swelling and blow holes. If this oxide can be reduced as metallic copper and the oxygen removed as a solid slag and not as a gas, the result will be a solid casting. The oxygen having a greater affinity for silicon than for copper, leaves the latter and forms silica and silicate of copper, which floats on the melted copper as a slag and is skimmed off. None of the silicon remains in the casting. The amount necessary to use is so small that but little is added to the cost of the castings. The results are equally good where silicon is used in alloys of copper and tin.

Babbit Molds.

AN artistic babbit mold, said a knowing one recently, does more toward selling a manufacturer's product than his entire force of drummers; in fact, if his babbit is not made in artistic molds he is not "in it," so to speak, as far as the retail hardware trade is concerned.

Ten women out of ten are attracted by the appearance of a thing, and they will buy it even if it is not quite as good as some other article, as long as it is the more beautiful. Men are much the same way, and it is no exaggeration to say that seven men out of ten will give a bar of babbit cast in an artistic mold the preference over a less beautiful bar, even if the price is a trifle higher. The other three men are proof against anything that is calculated to dazzle or to deceive the eye, and are not carried away by imaginary considerations. The fact remains, however, that the bar of babbit having the finer lines and the sharper corners, the more artistic looking square, octagon, etc., is the article that catches the crowd and sells well.

What it Is to Be Superintendent.

Superintendent (rushing into foundry and accosting foundry foreman)—Great Scott! Wilson, one of those columns on the post office job has fell and broke! we're ruined, we're ruined!

Foundry Foreman— —!—!!

S.—What thickness is there?

F. F.—$\frac{5}{8}$".

S.—And the specifications called for 1". They'll never take them; they'll be sent back on us and our bond forfeited.

F. F.—Why, if they say anything tell them the column belongs to another job.

S.—You're a jewel, Wilson; I'll do it.

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Tortimolite Process.

THE Howard Harrison Pipe Works, of Bessemer, Ala., are considering the advisability of adopting the Tortimolite, or Cole process of treating iron in the pig bed or ladle. Experiments so far have proved entirely satisfactory, and the process, once thoroughly tested some years ago, has withstood the scrutiny of this great firm of pipe founders and is in a fair way of being adopted. The process, in substance, consists of a method of saturating iron with carbon in the form of powdered graphite lined on the iron molds or ingots, and is based on the invention of J. W. Cole, of St. Louis. The specifications of the patent covering this process are given below as a matter of considerable interest to foundrymen in general, and in particular to those who have made a study of the metallurgy of iron and would be interested to know the effect that excessive amounts of carbon would have on iron.

Be it known, that I, James W. Cole, a citizen of the United States, and a resident of the city of St. Louis, Mo., have invented a certain new and useful improvement in methods of casting iron pigs, ingots, etc., of which the following is a full, clear and exact description:

My invention relates to a process of treating iron, and more particularly to a process by which iron which has been decarbonized, or which is not thoroughly saturated with carbon, may be supplied with the desired proportion of carbon and otherwise improved without the introduction of foreign impurities or other agents, such as manganese or silicon.

In the production of cast iron for foundry use it is usually desirable to provide a pig iron as thoroughly saturated with graphite carbon as it is possible to secure under the conditions of smelting in a blast furnace, but on remelting in a cupola for the purpose of casting, it is found that there is a decrease in the amount of carbon, silicon and manganese and an increase in the amount of sulphur contained in the metal. Of these changes, the decrease in the amount of manganese tends to the formation of gray iron; but its action is quite feeble, and is much more than overpowered by the other changes, all of which favor the formation of white iron, so that as a final result there is a strong tendency toward the formation of white iron, and the production of castings hard and brittle, and of a tensile strength approximately less than the original character of the pig iron would justify. A second and third remelt of such a casting increases its brittle character, so that iron thus subjected to the remelt is classed as scrap iron, and is of slight value except for the commoner kind of casting.

My invention has for its object, therefore, to increase the percentage of carbon, and even saturate the iron when in an incompletely saturated condition, or when decarbonized, with carbon, in such a manner as to increase the tensile strength and density of the iron, and at the same time to counteract the tendency to hardening which usually goes with an increased tensile strength, and even to reduce its normal hardness.

Incidentally I seek by my process, to provide a mode of casting iron in metallic molds without chilling. I have ascertained that iron, when in a molten condition and at a temperature at which it runs freely—viz., a temperature of about 3,000° Fahrenheit, or upward—when brought into contact with carbonaceous material in a pulverulent condition, acts to dissolve the carbon, which becomes incorporated into the iron, and that if a sufficient quantity of pulverized carbon is acted upon, a distinct and material change in the character of the iron takes place throughout, contributing a material increase in the softness of the iron and a density or fineness of grain of the product very noticeable on near inspection. Other changes also take place in the metal, the exact nature of which I have not yet been able to ascertain, but I believe that the finely divided carbon exerts a reducing action upon the slag and oxides entangled in the iron and causes their removal.

In carrying out my process I find it best to introduce the pulverized carbon in the forms of graphite, plumbago, or the like, and in as fine a state of division as can practically be obtained, into

metallic molds by coating the interior of the mold with a paste composed of pulverized carbon and water with or without gum arabic or an analogous substance to insure its adhering to the wall of the mold, thereupon to subject the mold to heat for the purpose of evaporating the water, and finally when the mold is still hot—say at a temperature of not less than 200° Fahrenheit, or thereabout—to introduce molten iron having a temperature of not less than 3,000° Fahrenheit, and preferably approaching the highest temperature obtainable in the cupola, to wit., 4,000° or upward. The iron is then allowed to cool in the ordinary manner, and the casting is found to present the characteristics of increased tensile strength, softness and density before mentioned.

Another mode under which I have successfully affected the operation on iron remelted in a cupola, has been to prepare ingot pans each capable of holding an ingot of, say 100 pounds, by coating such pans with pulverized carbonaceous material (graphite or plumbago) combined into a paste with water, and sometimes with and sometimes without a small amount of gum arabic or other analogous substance, heating the pans, and thereupon introducing the iron in a molten condition and at a high temperature. The ingot thus produced is thoroughly saturated with carbon and may be re-melted in the cupola for re-casting.

Different irons require, for the best results from the treatment, the employment of different proportions of pulverized carbon; but it may be stated, as a general rule, that the treatment with graphite in a proportion of upward of 1-32 of 1 per cent., but ordinarily not exceeding 2 or 2½ per cent., may be used with full benefit. In the treatment of scrap iron, usually bought in open market and varying very materially in its character, the process has been very successfully carried on with about 1-10 of 1 per cent. of pulverized carbon, by weight. In the treatment of certain pigs—such as Bay View pig—when ¼ of 1 per cent. of pulverized graphite was introduced into the mold, it was found that the entire quantity was not taken up. The calculations under difficulties, indicating that perhaps 1-12 of 1 per cent. had been taken up, leaving the rest in the form of a deposit on the sides of the mold. It is apparent, therefore, that by increasing the thickness of the pulverulent lining to provide a quantity of carbon in excess of the amount which the iron will take, successive castings under the process may be made in the same mold after one application of carbon thereto.

The peculiar action which takes place in the iron while undergoing the changes due to the operation of this process, is readily observable if, instead of running the iron into the ingot pan, where it is to solidify, or into the casting mold, it shall be run into the ladle which has been previously supplied with a coating of carbonaceous material in a pulverulent condition and practically a free state.

From the ladle it will be quite apparent that the iron may be run into molds or into an ingot pan, also treated or not. The operation of treating in the ladle is not claimed herein, as it forms the subject matter of a concurrent application for letters patent filed December —, 18—, Serial No. ———. If the temperature of the metallic mold is slightly raised, there are no chilling results. In practicing the process in this manner, it is observed that the iron thus introduced into the ladle undergoes a peculiar agitation or ebullition not observable when the same iron is introduced at the same temperature into a ladle not so prepared, and that the molten iron retains its fluidity for a much longer time than the iron in the untreated ladle. As a result the metal may be poured into light and intricate castings with a facility equal to that obtained with an iron high in phosphorus, and the castings thus produced possess relatively the same increased tensile strength, softness and density observable with castings made in the prepared mold direct without previous treatment in the ladle. A great practicle advantage results from this prolonged fluidity, as it permits the ladle to be carried a greater distance than is possible under the common practice without such congelation of the metal as will interfere with the production of a good casting.

As before stated, any kind of pig or scrap iron can be effectively treated and improved so as to have an increased tensile strength, softness and density, but the proportion of improvement varies in inverse ratio to the quality of the original metal. A low grade of pig is improved to a much greater degree than a high grade of pig. Under all circumstances I find it necessary that the carbon shall be finely divided, not exceeding in granular dimensions fairly fine sand, and under the conditions of heat possible in carrying out the process at the cupola, it is desirable that the carbon shall be reduced to the finest practicable state of division, as before mentioned.

The samples which are filed with the present application are made from No. 3 Bay View pig re-melted, and at a temperature of about 3,500° Fahrenheit, introduced into a metal (cast iron) mold holding about six pounds, into which had been previously put about 1-5 of 1 per cent. by weight—say 96 grains—of carbon in a finely pulverized condition. The carbon was mixed with water into a paste, to which was added a very small quantity of gum arabic, and while in this condition was applied to the mold with a brush, this being spread uniformly throughout the mold. The latter was thereupon heated to about 150° Fahrenheit, and the Bay View iron at the temperature named was introduced into the mold. The samples on file represent a piece of the original pig, a piece of the iron run into a sand mold, and a piece run into the metal mold previously coated, as stated. The two samples of cast iron were taken from the same ladle and the conditions of pouring were identical to both.

The untreated casting shows on an analysis the following composition: Total carbon, 3.351; graphite, 3.063; silicon, 2.137; phosphorus, .75; tensile strength (average two samples), 18,524.5 pounds per square inch. One sample showed a tensile strength of 18,449 and the other, 18,600.

The treated sample, which can be readily distinguished from the other by the very noticeable increase in density, and softness shows, on analysis, the following composition: Total carbon, 3.392; graphite, 2.853; silicon, 2.021; phosphorus, .689; tensile strength (average two samples), 28,622 pounds per square inch. One sample showed a tensile strength of 28,722, and the other 28,522. The analysis shows a material increase in combined carbon. There is an increase in the tensile strength of the iron of 10,097.5 pounds, or about 55%, while the treated iron is softer than the untreated iron as the results of this process. It may be stated that a mixture of scrap and pig iron subjected to this treatment showed an increase of 50% in tensile strength accompanied by an increase in softness and density.

The process herein described is to be carefully distinguished from the process in common use by which the exterior of a casting has been given a smoother surface by dusting a small portion of powdered graphite on the interior of the mold. Under this process no change in the constitution of the iron was sought or affected, neither of the essential conditions of heat and quality apparently being present. The purpose was different and the quantity of graphite was too slight to expect any noticeable effect in the line of improvement, which forms the subject of this invention. My invention is also to be carefully distinguished from any process in which the carbon is rendered hard and slaty by the association with it of oil clay, or other substance, since it is essential for success with any process that the carbon be in a finely divided state and the particles easily surrounded and absorbed by the metal.

I am aware of a process by which a coating essentially solid in its character and of a thickness of a half-inch or thereabout, has been provided on the interior of molds to serve for heat non-conducting purposes in the process of of casting; but, as will be apparent, such a procedure is foreign to my invention and is not to be included therein. It is probable that the non-conductive character of plumbago contributes an advantage in the practice of my process to the extent that it assists in preventing the chill of the iron at the surface adjacent to the mold; but this effect, if obtained,

is a minor feature of my invention.

By none of the processes above mentioned as existing before my invention, or any other process heretofore practiced with which I am familiar, has the very marked improvement above mentioned been obtained, and the importance of the invention arises, not only from the remarkable character of the product, but from the fact that the practicing of the process under ordinary circumstances involves an insignificant additional expense to the ordinory cost of treatment. It will be remembered that the commercial value of iron is largely governed by the tensile strength and the ease with which it may be manipulated in the foundry and machine shop. The loss due to the treatment by my process is so slight that it may be disregarded.

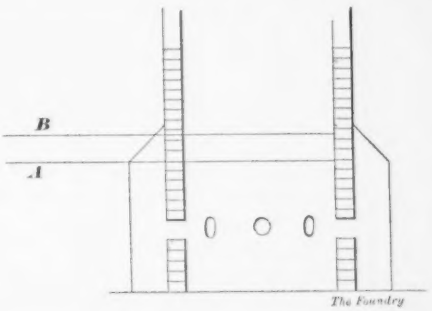
Melting Scrap Tin, Sheet Iron, Etc.

ALEX. CAIRNS.

THE melting and casting of articles from scrap tin, sheet iron, sheet steel and scrap malleable cast iron castings is an industry that in our larger cities has attained considerable proportions. Tin cans, tinshop and cannery clippings, the cuttings from galvanized iron, sheet steel, malleable cast scrap, cast and wrought borings and turnings have all found their sphere of usefulness in the manufacture of sash and elevator weights and similar castings in which the hardness of the product is not an objection.

In preparing the metals for the cupola the lightest metals such as clippings of tin, sheet iron, etc. are placed in a square iron box 18″ by 18″ at the top and 20″ by 20″ at the bottom and 36″ deep. This gives about ⅝″ bevel to the foot. The box or press is filled and hammered down with a ram operated by steam or hand power, the resulting ingot is approximately 20″ by 20″ by 6″ and is in convenient shape for handling. The balance of material requires no preparation other than is usual in cast iron except in the case of boreings which will receive attention under the head of charging.

None, but the larger diameters of cupolas can be used for this class of work. They should be rapid melters and be of such construction that they will admit the greatest quantity of blast per bulk of fuel. To obtain rapid melting a high melting point is necessary and a high melting point can only be obtained by excessive blast. In the illustration, the line A shows the approximate melting point in ordinary



practice with the usual quantity of blast. The line B indicates the location of the melting point when melting material of this kind and as before mentioned this raise of the melting point is secured by a greater force of blast. This of course means a larger ratio of fuel to iron than is customary in melting cast iron but the increase of fuel is of little consequence when the metal and slag can be kept fluid enough to prevent the cupola getting bunged up.

Considerable judgement is required in charging especially if the character of the scrap varies much. If for instance malleable cast iron, scrap tin and sheet iron and cast or wrought borings compose the heat. The metals should be charged according to their weight where possible, that is the heaviest scrap or the most difficult to melt should occupy the lower portion and the lighter and easier the scrap is to melt the higher it should be in the charge. With the classes of scrap at hand it is the best policy to place the malleable cast in first although it may not be as heavy bulk for bulk as the wrought or cast borings but if the borings should be placed on the fuel first a large part of them would slip down through the cav-

ities in the fuel and get below the melting point. This would also be largely the case if the borings were charged on top of the malleable scrap making it safest to place the scrap tin on the malleable and the borings next. The latter however must not be spread in a thick layer upon the metal below it, as it will choke the furnace up. When it is necessary to use large amounts it is best to place it in tin cans or charge it unevenly between two layers of tin scrap.

SLAGGING

It is absolutely necessary that the cupola be slagged early and the slag kept flowing freely. To insure this, limestone should be used on the second and not later than the third charge. The slag hole should be large enough to be kept open throughout the heat and never stopped up for more than a few minutes if at all. It is the best practice to tap out as soon as the iron begins to run out of the slag hole.

COKE.

The best quality of coke can only be used sucessfully in melting this class of material. There should be no "black ends" among it as "black ends" in coke is an indication of a lack of thorough coking which consequently means a deficiency as regards heat producing and lasting powers. To avoid the black ends what is known as selected coke should be used which can be bought of coke dealers at an advance of 50 to 75 cents per ton over the regular grade. A ton of hard or selected coke will produce heat units equal to 1½ tons of the ordinary coke with the added advantage that there is from 30% to 40% less ash about it, and as it is the rapid accumulation of ash in a cupola which determines the length of time it may be operated continuously, the advantage in using selected coke will be apparent. The less ash in the cupola the easier it is taken out by the slag while the more ash the harder it is to keep the furnace in working order and the slag flowing freely.

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Those Test Bars.

THE casting of 500 test bars by The Detroit Stove Works under the supervision of their superintendent, Lafayette Crowley, for W. J. Keep, a member of the Committee on Standard Tests of the American Society of Mechanical Engineers, is a matter of very great interest to the foundrymen.

Two complete sets of specimens were made requiring twelve separate cupola heats. For one set Iroquois pig iron made with coke at Chicago was used, and for the other set Hinkle charcoal pig iron made at Ashland, Wis.

These irons were selected because both of these furnaces will furnish iron on a guaranteed analysis. Each set consists of series, containing respectively 1.00, 1.50, 2.00, 2.50, 3.00 and 3.50 per cent. of silicon and the bars of each series comprise two each of every size and shape of test bar that has been used both for transverse and tensile testing.

The committee expect to establish experimentally a definite relationship of strength, deflection, set, shrinkage and chill between test bars of different sizes and shapes and with varying composition. Until this is established it is not possible to correctly compare records of one sized test price with records from another size of test bar. These test bars are now in the hands of Mr. Keep and will soon be shipped to the several parties who are to determine the strength and deflection. The report of this committee is expected in December. Each test bar will be subjected to chemical analysis to determine how nearly chemistry will account for physical characteristics.

When a trade journal gets so interesting that its readers stay up half the night to read it, or when the matter in it is so valuable that our subscribers can't clip out one item without spoiling something equally good or better on the other side, it becomes necessary, in the ordinary course of events, to mention the fact, adding incidentally that it has always been our intention to make THE FOUNDRY so interesting that our readers will not go to bed at all until they have finished it.

THE FOUNDRY

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THE FOUNDRY is issued promptly on the tenth of each month, and will spare no endeavor to furnish valuable news and information to those interested professionally or incidentally in molding, melting, mixing of metals, foundry management, etc. Persons connected with any of these lines of industry will confer a favor upon the Editor of this Journal by sending him news from their section of the country pertaining to the foundry interests, particularly individual theories and experiences of practical value.

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The Trade Situation.

A STEADY improvement has been apparent since our last issue, and the approach of the fall season has not been noticeable otherwise than by an increased activity.

Dealers in equipments and supplies all report a greater increase in the number of inquiries, and while orders are not all they ought to be, yet they are improving. This is especially true in the West, which seems to be improving more rapidly. The first ill effects of the panic were noticeable there, and will probably regain lost ground first, this, of course, being greatly accelerated by bountiful crops in many sections.

Coke continues scarce and commands a high price, it being sold up to $1.75 and $2 at ovens, when prompt shipment was required. The iron market remains about the same—if anything, prices and terms are a little firmer than some time ago. A recent noticeable feature in this line is the apparent set-back given Southern irons in the Chicago market. The Northern furnaces have quoted lower figures to the demoralization of Southern trade.

That Armor Plate Scandal.

IF there has been at any time a greater series of frauds practiced upon Uncle Sam's government than those brought to light by the congressional committee appointed to investigate the charges concerning the defective armor plate furnished the government by the Carnegie Company, well, we would like to know it.

Eleven separate charges were made and carefully investigated, and out of that number the following nine were found to be either wholly or partly true:

"That plates did not receive the uniform treatment required by the specifications of the contract.

"That false reports of the treatment of plates were systematically made to government inspectors.

"That bolts did not receive the double treatment required.

"That specimens taken from the plates, both before and after treatment, to ascertain the tensile strength of each plate, were stretched without the knowledge of the government inspectors, so as to increase their apparent tensile strength when actually tested.

"That false specimens, taken from other

plates, were substituted for specimens selected by government inspectors.

"That the testing machine was manipulated by the order of the superintendent of the armor plate mill so as to increase the apparent strength of the specimens.

"That specimens selected by the inspectors were re-treated before being submitted to test.

"That plates selected by inspectors for ballistic test were re-treated with the intention of improving their ballistic resistance, without the knowledge of the government inspectors.

"That, in violation of the contract, pipes or shrinking cavities, erroneously called blow holes, in plates were plugged by the contractors, and the defects concealed from the government inspectors."

The most astonishing part of the whole business is that the two superintendents in charge of the Carnegie works have, on examination, admitted the truth of the bulk of the charges, but declare that they alone were responsible and not the company, as the latter knew nothing of it, and yet the same gentry are retained in their positions, which is a practical indorsation of their actions, if anything were needed to convince an impartial person that these gentlemen were not only acting with the knowledge, but also with the connivance of the Carnegie Company's officers.

That pious, philanthropic, devoted American Christian citizen, Andrew Carnegie, in his far-off British home does not seem to find it necessary to use either the mails or ocean cable lines to express himself on the question, as one would naturally expect such a devoted exponent of truth and morality to do.

Every little while, amid the music of brass bands, ringing of bells and profuse decorative effects, Mr. Carnegie comes to the front with a donation of some kind or other. It may not be out of order to suggest to his saintship that 60,000,000 American people would prefer, before he gives any more, that he should return to them some of the hundreds of thousands of dollars that a congressional committee, composed of men of both the great political parties, believe and declare his company has stolen from the United States Treasury by descending to the use of methods so contemptible.

Chemistry in the Foundry.

IN commenting on the efforts of the iron foundrymen's associations in solving the problem as to whether or not chemistry is of any value in foundry work, *Cassier's Magazine* for September, says: "The great majority hold that it is not, and that practical experience is the only thing that will insure good castings." This statement is in error and is over-drawn. The question is: Are the analyses of pig iron as furnished by the furnaces, sufficient to guide us in making intelligent mixtures, or must we necessarily have to employ a chemist to mix our irons for us?

Mr. Keep, in his admirable system of foundry chemistry, has shown that we can get along with the analysis furnished us by the furnace chemist, and that a chemist is not a necessity around an iron foundry.

The article further states: "The foundrymen are now going through the experience that the blast-furnacemen went through about twenty years ago. About that time a few of them began to employ chemists, but the old-timers held that the only proper way to test an iron ore or a fuel was to try it in the blast furnace.

Our contemporary is evidently not aware of the fact that chemistry cannot say what iron an ore will make from its analysis, unless a similar ore has been tried in the furnace; it cannot say what results a fuel will give, unless it compares it with other fuels that have been tried in practice; it cannot say what physical characteristics an iron will show, unless it can first analyze an iron that has shown such characteristics; in fact, as far as the melting and mixing of iron is concerned, it can do nothing without a practical demonstration as a guide. Every result is necessarily dependent on a practical test. The latter being obtained, chemistry steps in and in analyzing it, furnishes us with an approximate guide for the future.

Of Interest to Brass Founders.

IN these days, when so much attention is being given to the brass foundry and the various mixtures possible where the different alloys are properly used, every scrap of information on what has been hitherto a somewhat mysterious subject is eagerly scanned by the progressive brass founder.

We desire in this connection to draw especial attention to the article on "Silicon in Copper," by Fred. J. Davis, which appears elsewhere, feeling sure that it will be found very instructive by any one at all interested on the subject.

The amount of interest shown in our brass

foundry department is also shown by the large number of questions on it in the "Question Box" of this issue.

The Foundry at Pullman.

THE article appearing elsewhere descriptive of some of the phases of the Pullman trouble will be read with especial interest just at this time. The author, Mr. J. T. Bramhall, has already achieved some fame in this direction by his series of illustrated articles appearing in Frank Leslie's weekly. Owing to the fact that he has not been satisfied with any superficial examination of the condition of things, but has gone beneath the surface and handled what he has there discovered in an interesting as well as impartial style, it lends peculiar weight to what he has written.

A Great Shame.

THE Chicago *Tribune* of September 2, furnishes the details of a fire that occurred at the foundry of Cribben & Sexton, and which did damage to roof, building and work amounting to $1,500. The *Tribune*, though, furnishes its readers with the information that "*one of the furnaces became overheated and the fluid metal set the cupola on fire.*"

We are a little surprised that such a well-known foundryman as Mr. Cribben should allow one of his furnaces to ever become heated at all, and even more astonished that he should permit any of his employees to allow his cupola to catch fire. Just what might have happened if Chicago's great fire department had not promptly squelched the fire in that cupola, is hard to predict, and we hope the lesson will be heeded in the future and that Mr. Cribben will see that his employees keep all fire away from that important article.

Above all things, fluid metal should not be permitted near cupolas, as the frail, combustible material of which they are constructed is sure to be damaged more or less.

The Buffalo *Times* of August 13, also describes the severe damage done to a cupola in the foundry of the Dunkirk Engineering Works.

Now this is too bad; something has got to be done, and done right away. Either these cupolas have got to be built of some better material than sheet iron and fire brick, or else greater precautions must be taken to prevent these altogether too frequent conflagrations.

Perhaps our foundrymen's associations might tackle the problem and appoint a committee to interview the insurance companies and underwriters' associations with a view of some united action. The idea of a cupola being permitted to burn simply shows carelessness somewhere that should be stopped.

Two Years Old.

ANOTHER mile stone has been passed and THE FOUNDRY finds itself two years old and with this issue enters upon its third year.

Now, we are naturally bashful (two-year-olds generally are), but nevertheless we feel as if we could at this time consistently say a few words in our own behalf without leaving ourselves open to the charge of vanity. THE FOUNDRY came on earth and became a living reality in September, 1892. Those who were responsible for its appearance did not seem one particle ashamed of it—in fact, appeared as proud as the most fond parents, and the congratulations they received from all sides as to the apparent vigor, health and good looks of the youngster did not lessen by any means that most natural feeling.

For the first few months after the birth of this aggressive youngster, he seemed to grow and flourish in a most phenomenal way, to the great pride of all admirers who unhesitatingly predicted many pleasant things for his future, but just about this time the whole country became overrun by a financial epidemic that affected almost everyone, prostrating the majority and bringing to an untimely end many that had withstood the storms and ills of a long life, and causing the early death of thousands of infant industries whose future had all been more or less full of promise.

Thanks, however, to the best of constitutions and perhaps a little care coupled with some natural advantages, THE FOUNDRY suffered but little, and at no time was seriously affected by the prevailing epidemic, and now that the ravages of this dread disease seem to be rapidly disappearing, rapid convalescence is seen on every side, it has taken a fresh grip on life and business, and with a desire to make up for lost time, enters upon the third year of its existence full of energy and determination to fulfill in short order all the predictions of its friends and well wishers. It has cut its teeth (eye teeth and all) and before its third birthday comes around, hopes to show a measure of vitality equal to that displayed generally

by older journals, with better prospects, all things considered, than most of them.

Who Says That Times Are Bad?

NO more encouraging sign of the times could be imagined than the fact that one of our advertisers (The S. Obermayer Co.) feel warranted by the condition of business to invest in a six-page advertisement in this issue.

At a time when the main thing needed is public confidence, any concern that is willing to show their nerve, enterprise and faith in the future in such a way are deserving of not only credit, but patronage.

Judging from the letter, however, that accompanied the request for so much space, we are of the opinion that this concern are doing a quiet little business all by themselves, as they state they had the largest trade in July that has fallen to their lot during five years, and that August was a continual boom.

Everybody Shake.

A SHORT time ago THE FOUNDRY received the following letter, which speaks for itself:

WM. STEWART, Pres. and Gen'l Manager. L. A. CHESLEY, Secretary.

OFFICE OF

The Danville Foundry and Machine Company

MANUFACTURERS OF

Engines, Steam Pumps and General Machinery.

DANVILLE, ILL., July 17th, 1894.

THE FOUNDRY PUBLISHING CO.,
DETROIT, MICH.

GENTLEMEN:

Please see that THE FOUNDRY reaches us hereafter. We would not be without it for a great deal, as it contains much that should be of interest to every foundryman in the country. It may please you to know that it was through the advertisement in your paper that we bought both the cranes in our shop from the Craig Ridgway Co., of Pennsylvania, and they are the best thing of the kind we ever saw; also two cupolas from the Springfield Cupola Co., Springfield, O., and one 6,000-lb. ladle from the Detroit Foundry Equipment Co., Detroit, Mich. Whenever we need anything for our foundry we always go to THE FOUNDRY to find it. Yours very truly,

DANVILLE FOUNDRY AND MACHINE CO.

By *Wm. Stewart, Pres.*

Although accustomed to little surprises of this sort, we were naturally somewhat pleased at the sweeping nature of the testimonial contained therein, and could not refrain from letting those concerns whose names were mentioned know of it. One of them, the Craig Ridgway Company, saw the value of the letter and have reproduced a portion of it in their advertisement in the *Iron Age*.

If this sort of thing keeps on, we are in danger of losing our accustomed degree of modesty and must beg our friends to save us from such a fate.

We know, of course, that THE FOUNDRY is a good thing, and are glad to let others know it, but when subscribers and advertisers alike begin to fall over each other (and us, too) in their rejoicings, we begin to feel as if we were fulfilling our mission.

The Scrap Heap.

Our readers will notice that in some respects this paper is somewhat larger than some of our recent issues and that an extra effort has been put forth to render it a little more than unusually attractive.

* * *

We are celebrating not only because this is a sort of birthday issue and THE FOUNDRY is two years old, but we are rejoicing because a great question affecting almost every human being in the country has been finally settled and business, the great incentive of our daily actions—the country's life, so to speak, is again assuming a normal condition after a period of depression, inactivity and general lassitude that has taught us all some lessons not soon to be forgotten.

* * *

It is doubtful whether any one thing since the close of the late war is so full of importance to our whole people as the settlement of this tariff trouble, and that its agitation has had much to do with the commercial troubles of the past eighteen months is proved by the "transformation scene" that has taken place during the past few weeks.

* * *

The bank clearances for the last week in August were 59% in excess of the corresponding week last year. No greater proof needed. If any were wanted, it is furnished by the increase in our advertising space, as showing what progressive business men think of the outlook.

* * *

We notice by a recent issue of the *American Machinist*, that Mr. Thos. D. West comes to his own support on behalf of round test bars

and in opposition to the square bar cast against a fixed chill, to find the shrinkage, and publishes what is certainly in some respects an able and ingenious article. In all probability Mr. West will have to stand the fire of criticism so freely leveled at all who propose new methods, and his ability to defend his position in opposition to the supporters of the square test bar, will be utilized to the full limit.

* * *

It seems to THE FOUNDRY that nothing but praise is due anyone who spends his time (and time is money) in extensive experiments or studious research trying to throw more light on the hidden truths of the natural or scientific world, and we feel sure that Mr. West will gladly welcome cordial, good-natured criticism whose only object is an unselfish desire to aid this laudable work along.

The Krank's Korner.

BY COMO.

IT is a deplorable fact that more interest is not shown in the matter of producing efficient workmen. THE FOUNDRY has from time to time published articles from well-known writers on the subject of bettering the existing plan of dealing with apprentices, but there does not appear to be as much interest shown in the subject as one would naturally expect from readers of THE FOUNDRY. Messrs. Boland and West have done considerable in this line, but they have not come to any satisfactory plan of apprenticeship, except that being bound out for four or five years is a most essential thing, and that the apprentice must also have a good show or opportunity to learn the business. This good show or opportunity is an indefinite quantity; it is measured almost entirely by the disposition of the foreman in such matters, and the amount of friends the apprentice makes among the men in the shop. This latter fact amounts to nothing in the absence of the former, and as such the chances of the apprentice getting a "show" are decidedly slim. It will be apparent therefore that something more radical is necessary than has yet been suggested. Less discretionary power should be vested in the foreman. It should, in fact, be a matter left to the careful consideration of the employer. It is simply a matter of being able to produce a first-class line of work in the future with him, and as long as he depends on securing the service of good workmen, turned out by some one else, just so long will he neglect the apprentice problem, and the longer he neglects the latter, the sooner will the demand for good workmen exceed the supply.

* * *

It is interesting to note in this connection the present condition of the stove manufacturers in proof of the above. Some years ago the writer called attention to the fact that the prevailing method of turning out specialty molders would in all probability result in a scarcity of desirable workmen in the future. That this has come to pass, there is not the slightest doubt; in fact, the matter has become of such importance that a paper on the subject was prepared by request and read before the 23d annual meeting of the National Association of Stove Manufacturers, assembled in Chicago, May 3, 1894. This paper, entitled "How to Produce Good Workmen," was published in the May issue of THE FOUNDRY and is particularly valuable as coming from the pen of Mr. Henry Cribben, of Cribben & Sexton, Chicago, Ill. Mr. Cribben has spent his lifetime at the business, understanding it thoroughly from the smallest detail in the foundry to the business detail incident to one of the largest stove manufactories in the world, and is in every way competent to handle the subject. But like a great many other writers on the subject, he inclines a great deal toward the ideal workman. In his judgment of what "constitutes a good and efficient workman" he describes the ideal more than the practical. A workman such as he describes is, as he says, rare, and it is quite as rare to see such a workman in the sand heap; there is too great a demand for the services of such men to find them working at manual labor.

* * *

Mr. Cribben has divided molders into three classes—the "hobo," or lower class; a second and a third class, and his definition of them cannot be improved on. It is a somewhat creditable fact that, though in the minority, there are still quite a number of the third, or more properly, first-class molders. They do nice work, spare no pains to excell, and take an unusual interest and pride in their work; in fact, they have taken advantage of all the opportunities for acquiring knowledge that surround them; they have gone no further because their opportunities have come to an end,

and the writer is of the opinion that when shop opportunities end, the technical should begin, with a close study of the matter appearing in the columns of THE FOUNDRY from month to month. This will give them a knowledge of iron, of brass, of the cupola, of the nature of fuel, blackings, facings, and sands, in short, of everything they need to know regarding the foundry business. Opportunities of this nature did not exist 20 years ago, nor 10, nor 5 for that matter, and such advantages make it possible for the molder of today to acquire a fund of information on matters pertaining to the business, that the older molder never possessed.

* * *

The questions Mr. Cribben would propound to the candidate are good and to the point, and the sooner the boy is impressed with the fact that he must attend to business, the quicker results can be looked for. It seems to the writer, however, that the month's trial allowed by him is hardly enough, as the art of molding is mysterious, especially to outsiders. If we were to take, for instance, six likely boys and start them in at the same time, after the necessary time spent in the core room or getting acquainted in the shop, and give each one a short lecture propounding the questions laid down by Mr. Cribben and give them to understand that their success depended altogether on the quality of work they turned out. They could then be started on some single job. At the expiration of three or four weeks, we would likely find that perhaps two of them turned out nicer work than the rest; there might be two of them that were in more for playing tricks, paying no attention to their work, and there would probably be two who seemed to try hard enough, but who somehow or other could not get along. Here is where the instructor or foreman should step in and say to the one, "Your work is very good for boys of your experience. Try and make your work always like that, and I will pay you $3.50 per week." To the next: "Your work is not as good as the others, but watch them, try and do better, and we will pay you $3 per week, and when your castings are as nice as those two, we will pay you the same wages." To the next: "Your castings are no use to us; nearly all of them go to the cupola. You will have to do better or we can't keep you. We will pay you $2.50 per week."

* * *

We have now placed a premium on good work; we have also inaugurated a spirit of rivalry; we have shown that we will pay more for good work than for bad, and have consequently held out inducements for a boy to go to extra trouble to make his work nice. At the end of another month's trial we would probably find that one of the two best workmen had shown signs of being very neat and particular, the other also did nice work, but not so much so as the former; of the second two, one was worse than ever and the other about the same, and of the last two, one had shown signs of improvement. We will now see that at the end of two months we have an extra good, a good, and two fair prospective apprentices. This is, of course, a large percentage of the six boys, but it is based on the person making the choice displaying good judgment.

* * *

Now is the time to talk about learning the trade in earnest, for they have gained something of an insight as to what it is and can say whether they will like it or not. The arguments Mr. Cribben puts forth in regard to the earning capacity of good molders as compared with others would be very effective just now. When it is shown that a good workman can earn $1,072.50 per year, while a poor one can only make $643.50, such fact would most likely stimulate a desire or ambition among the boys to become good workmen; it would certainly at all events, be productive of much good.

* * *

The indenture papers can now be signed, stipulating a certain range of pay, and a certain percentage to be kept back until the apprenticeship expires. Mr. Cribben's suggestions in regard to starting him at piece work early, should be followed, and a premium placed on good work, as compared with poor, which, as indicated by him, would stimulate him to the acquirement of increased skill and dexterity.

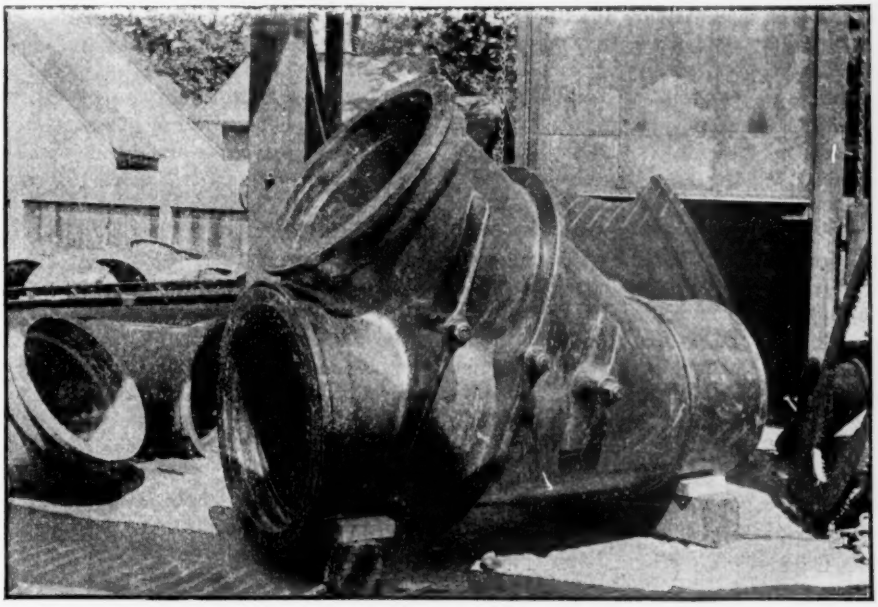
* * *

In conclusion, the writer wishes to say that a pretty fair sized volume should be written on this subject to do it justice, and the matter advanced in this article has been offered in the nature of suggestions only, with a probable view to creating argument on it. Mr. Cribben's paper on the whole cannot be improved upon, except possibly in detail. It is timely, from the fact that it is about the only matter published on the subject that aims at a thorough system. It should be adopted in whole or in

part without much more delay, and manufacturers, instead of wasting their time deploring about the scarcity of efficient workmen, should start in and prepare to turn out efficient mechanics themselves.

Y Branch.

THE engraving illustrates a Y branch cast for the Lancaster City Water Works, August 8, by the Reading Foundry Co., Ltd., of Reading, Pa. It weighs in the neighborhood of 10,000 pounds and as will be evident from the engraving is a nice casting. The branches are 36" in diameter, which would indicate an approximate breadth of 6½' and a length of about 9' for the casting.



Y CASTING.

In making castings of this class, leading foundries, such as the Reading Foundry Co., do not as a rule go to the expense of getting up a full pattern, unless there is a large quantity of the one kind of pipe wanted. In this case as the whole was swept up, it is only necessary to use a few strikes or sweeps to make the job in dry sand or loam.

In making this job in loam, which the practical molder will at once recognize as rather difficult, a base or foundation plate is needed of sufficient strength to carry the whole mold. Laying a few coarses of brick on it separated with plenty of fine cinders, with the necessary provision for taking the vent off between the ribs and in the crotch, we arrange to sweep up the horizontal or straight part of pipe.

The sweep having been made and strapped to say a 2" gas pipe supports for the same, in a form of trestle or support with half circle of 1" radius on one of its edges, are next set so that the lateral axis of the 2" gas pipe will correspond with the axis of the straight part of pipe. This having been arranged, we set the central rib. Leaving our sweep hang perpendicular to the base plate, we get the angle in which the rib lays by taking it off the drawing with mitre, sextant, or similar device. Having set the central rib in place the remaining ones are also set by measuring from the central, as they are set on the same angle.

Now we arrive at a condition to be overcome that causes this casting to be classed among the difficult jobs. It will appear from an inspection of the drawing, or the engraving, that there are parts of the casting which do not contract at the same time; especially is this true of the valley and crotch in which the ribs are placed. The pockets formed by the ribs retain the heat and prevent the cooling of the casting at that point, and consequently it will be evident that as all the shrinkage in cast

iron takes place between the point of dull red heat and that of no heat, nearly all the contraction between the ribs will take place after the outer portions of the casting have contracted and become completely cold. Therefore as the unequal contraction of a casting is to a great extent merely a matter of unequal radiation of the heat from it, we must, in order to overcome as much as possible existing conditions, provide for as rapid a radiation of heat from this locality as possible. It will be noticed in this connection that the most of the after contraction in this locality is lateral with the length of the casting, or at right angles to the ribs, the opposite contraction not amounting to much.

To overcome this contraction and allow the heat to radiate, we will in all courses parallel to the ribs and between the central rib and the bells, use a mud consisting principally of chopped straw with sifted gangway refuse, and between the ribs nothing but straw could be used in, say $\frac{1}{4}$" joints parallel with the ribs. In the crotch or between the bells we recognize a dangerous locality, not so much so on account of not being able to secure it, but rather because it is difficult to secure it and vent it properly at the same time. In securing and venting this we would use, say $\frac{5}{8}$" rods wrapped with straw, leaving say $\frac{1}{4}$" between the straw as it was wrapped around the rod. Placed close together with plenty of fine coke or cinders, this would secure it and give it all the vent required. Everything depends on the vent getting off and for this purpose a hole the width of a brick should be left open on the base plate immediately under this locality, and suitable connections made when the mold is rammed in the pit.

The mold is now built up in the ordinary manner, unless we wish to dispense with a sweep in making the upper branch, and strike it up with a straight edge. In this case we lay out the plan and angle of branch and procure a half circle of the same size as the flange on the bell. We also set in a segment flush with what will be the face of the mold; beginning with the bead on small end of pipe and setting it parallel with the face of the bell. The brick can now be set to the strike or straight edge, the whole covered with loam, sturried, and the mold finished up and placed in the oven.

In making the cope or top part of the mold we need a good stiff plate with trunnions cast on it and the necessary holes for gates, risers, vents, etc. We proceed to build the mold in the ordinary way, as already shown, being careful to locate the branch correctly, and as we use a loamed lifting plate on the joint to carry the mold, it is set in its place, connecting the bolts down through the base or top plate, and build the mold in the usual manner. Between the ribs we use a prickered plate or arbor previously loamed and dried, and a similar arrangement with suitable rods in the crotch, all of them being secured and bolted to the plate below. The mold is finished and run into the oven, and the drag part of the mold taken out and the core for it built on a thickness struck up in the mold. This part is again put in the oven to dry the core, and the cope part of mold is taken out and the core for it built in the same manner. In getting this core out to paste or joint with the other one, three or four inches of soft sand is placed on the joint and a good stiff bottom board clamped on and the whole turned over. The mold can now be lifted off of the core and the mold put together accurately by feeling the joints through the ends on the inside of mold. It is now marked and lifted off, finished and put together in the usual manner.

We have nothing to say other than what would be complimentary about the molders who made this job, and could say little less about the foreman and firm who can turn out work of this class successfully. It is a good job well done, and presents some features in the way of shrinkage that should be of interest to foundrymen and patternmakers. The importance of getting the right mixture of iron in it will be realized when the shrinkage is understood. The method of ribbing the weakest part is particularly commendable, and it is needless to say that the central rib is in the right place to do the most good. Recognizing the fact that the job is not a mammoth affair, running up into the tens of tons in weight, we are, however, aware of the fact that it is mammoth as regards the skill required to make it.

Emery Wheels.

THERE is, we believe, not one foundryman in America who would not be benefited by an inspection of the neat little catalogue for 1894, issued by the Tanite Co., of Stroudsburg, Pa. Emery wheels in ordinary foundry practice are a round arrangement that runs at no particular speed and against which a piece of casting is pushed with more or less force,

depending on the strength of the operator. It does not make much difference whether one side is worn off more than the other, nor does it matter much if one side is worn away and there is one or more ruts gouged in the face of the wheel. The fact that the wheel is a half-inch out of center doesn't cut any figure, as the rattling of the boxing seems to soothe the shattered nerves of the operator and jibe harmoniously with the surroundings. To show, therefore, the folly of such practices is one of the purposes of the Tanite Co.'s catalogue.

In the introduction an earnest plea is made for a better appreciation of the grinding industry, in which an indisputable line of arguments in its favor is to be found. Under the head of "Practical Hints About Emery Wheels" a great deal of valuable information of a practical nature is given.

Their illustrations of surface and emery grinders, gummers, stove grinders, etc., cover the field completely. The catalogue is sent on application, as is also the following printed matter: "Why Don't You Run Your Files by Steam Power?" "Comparative Value of Fifteen Varieties of Solid Emery Wheels," "Memento of the Tanite Co.'s Educational Exhibit of Abrasives, Columbian Exposition, 1893," and "Emery and Other Abrasives."

Other Ways of Working.

H. HANSEN.

PERHAPS in no other part of the molders' trade does so much difference exists as in the making of pulleys. In all the foundry literature published no other receives such a large share of attention as this. Nearly every molder has his own favorite ideas about how a pulley should be made, and it is a difficult task to persuade him to adopt something different, which interferes with his old practices.

There are so many different kinds of pulleys in use, too, that what would be working to advantage in one kind would be exactly the opposite in another; hence, the methods employed in one shop, and hereafter described, do not carry with them the recommendation of the writer, that they should be universally adapted in all cases, but are shown here, as the heading of this article indicates, for the purpose of illustrating other ways of working.

It may be stated at the beginning that nearly all of these pulleys are cast in open sand, or stating the case more correctly, without covering the rim of the pulley, from which it follows that the rigging used differs somewhat from that which would be used under ordinary circumstances.

The general plan of the pulleys in question is shown at Fig. 6, section Fig. 11, and Figs. 1 and 2 illustrates the molding of one of these pulleys with a segment of a pattern without cheeking it off and without employing any spindle as is usually the case.

A bed is leveled up with straight edges the required depth, so as to bring the top of the mold even with the floor, a wedge (a, Fig. 2) is driven in the center of this bed, and with a pair of trammels the circle (b, Fig. 1) is described, corresponding to the diameter of the pulley, less the thickness of the rim. The size of the hub being next ascertained, and if found to be less than the face of the pulley, a mound of sand or block of wood is placed underneath the core (c, Fig. 2) which carries a print (d) for the reception of the center core of the hub. The core (c) is then centered from the circumference (b, Fig. 1). The height the arm cores will have to be raised in order to bring the arms in the center of the pulley, is next established, and blocks of the required size are next placed underneath, as at e, Fig. 2. These blocks should be made wide at the bottom, as shown, to prevent the weight of the cores from sinking them down in the bed of sand, and thus throw the arms out of center.

The two cores (f, g, Fig 1) are placed in position first and centered with the straight edge (h), as it follows that if the distance (i) from the same to core-print (d) is identical on either side, the cores must occupy a central position.

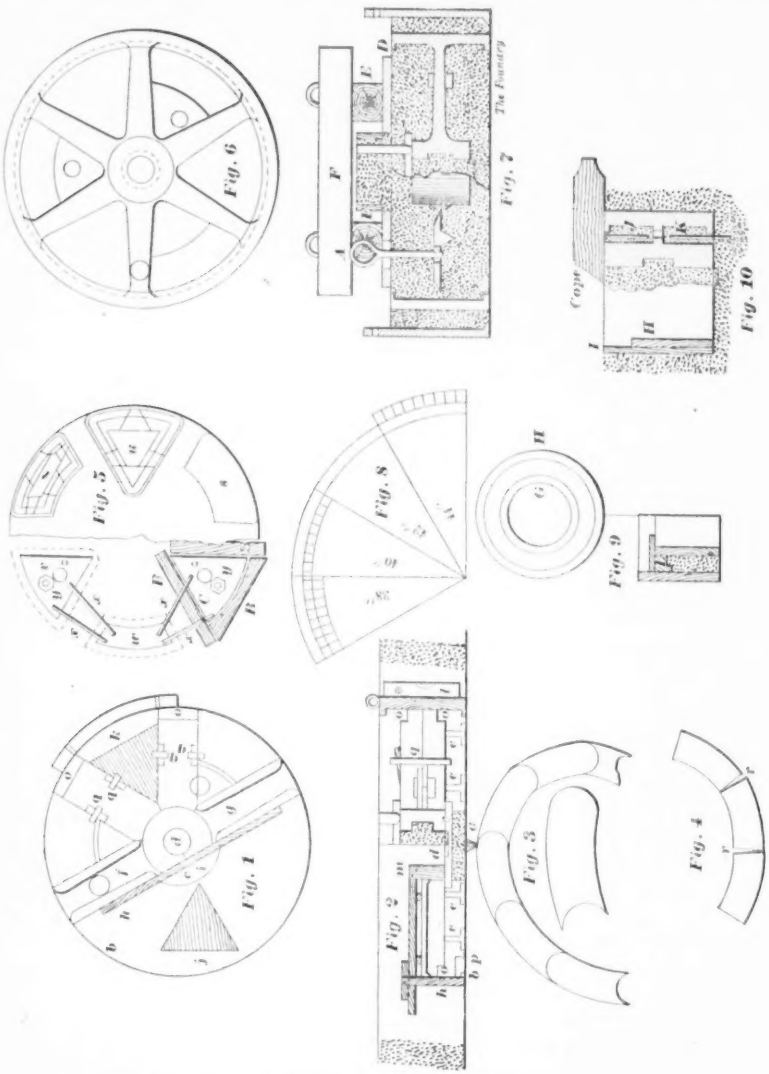
The two cores (f, g) having been set, the others may be put in their proper places with the aid of the sextant (j, Fig. 1), the position in which it is used being shown at k.

As no spindle is used, and the arm cores furnish the only guide for the seg-

ment to rest against, it is very important that these should occupy a true position. Two ways are shown for accomplishing this. The right hand illustration (Fig. 2) shows the segment placed on the circle (b) so that the inside of it is even with this circle, the core placed against it, and the level (l) used to insure of the segment occupying a true position perpendicularly.

To the left a different arrangement is shown consisting of the square (m) and the T square (n) used as seen, and it will be evident that if the T square is in line vertically with the described circle (b), the arm core must be in the desired position.

As these pulleys are all flanged, the space (o) shown in the arm cores is made to allow of these flanges being inserted, if the face of the pulley is so narrow as to prevent this being done otherwise. Should the rim of a pulley be so light as to prevent the ready withdrawal of these lower flanges when no cheek is employed, a set of cores as at p, (Fig. 2) can be placed against the segment.



In casting these pulleys no weights are used to hold the arm cores in place, instead a large saving in both labor and time is made by simply clamping the cores together, as at g, after they are placed where wanted in the mold.

Should it become necessary to cover the rim on account of the hub being larger than the face of the pulley, or from any other cause, a covering core, of which it at least must be said that it is handy, can be used, as shown at Fig. 3. The greatest point that can be urged in favor of its use is the fact that it can be made to answer for a very large number of pulleys of different diameters, and will in all cases fit itself without having to waste any time filing and making a joint, as will have to be done with the old class of covering-cores, that are not made for the exact job at hand, their defects being shown at r (Fig 4).

Fig 5 shows the way that pulley lifters are made to be used when a pulley is made in green sand altogether. A level bed is made and a circle described with a pair of trammels corresponding to the inside diameter of the pulley. The arm pattern is placed on this bed, and the position of the arms and webs marked as shown at s. This is a sure way of working, for when the pattern is placed it can be instantly seen whether it offers sufficient clearances or not.

The plan of these patterns is shown at t, u (Fig. 5), the central portion being cut out and the pattern divided, as shown, to permit of its withdrawal. The space (s) shows the appearance of the bed as marked off ready to receive the pattern. T, u shows the pattern in place ready to be rammed up; v, w is a view of the mold finished, with the wrought iron arms (x), the nuts (y), in which to insert the lifting hook (A, Fig. 7) and the guides (z) in place. A few pieces of boards (B) on which a small weight can be deposited, placed as shown, around the space (C) will prevent the metal from lifting that portion of the mold indicated by dotted lines.

Fig. 7 is a section through the mold of a pulley made in green sand altogether, with the rim cast open. When the mold has been made the required height, the plate (D), having holes cast in it that will clear the lifting screws, is imbedded solidly on the core; the mold is then finished in the usual way. After being closed and the runner built, the blocks (E) are placed on the plate for the weight (F) to rest on.

At Fig. 8 is shown a way of making a pulley larger or smaller than the pattern at hand. Forty-two inches being the diameter of the pattern, by putting 1″ strips on the outside, the diameter is increased 2″. The outside being rammed up, the pattern can be taken away and the inside built up when the strips must be withdrawn singly. If a pulley of smaller diameter than the pattern is wanted, the inside must be rammed up first. In the space marked 38″ two sets of strips are seen; this is made necessary to obtain the required size of the rim.

It is true that the molder has got a small amount of extra work to do in finishing such a mold, but it is also fair to state that where but a few pulleys are wanted, this item is very small compared with even the cheapest kind of a pattern.

Figs. 9 and 10 shows how an order was filled for a pulley 16″ in diameter with a 15″ face. No pattern being at hand, with the aid of two piston ring patterns (G, H) two cores were made and placed in the mold, as shown at J, K, being make the size wanted with the sweep L. In ramming up this mold, lagging strips (I) were placed outside of the ring pattern (H) to make the rim as called for.

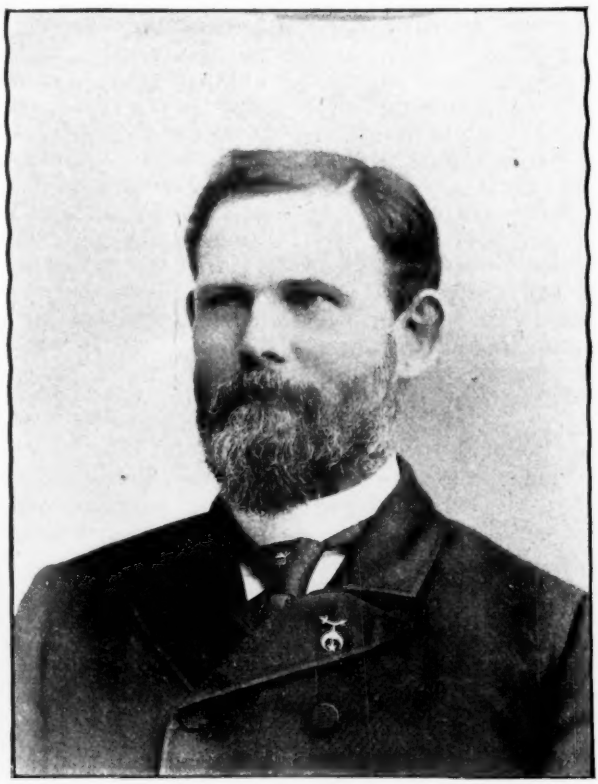
The Cleveland Facing Mills Co.

The fire a couple of months ago at the Cleveland Facing Mills in Cleveland, O., has resulted in other changes besides the complete rebuilding of the works on a much larger and more elaborate scale than heretofore.

Mr. George P. Millns, who has been with the company for 15 years, for the past 10 occupying the position of manager, has associated with him Mr. F. H. Chamberlin, a young man of well-known business ability in the Forest City, and they have purchased the entire plant, with machinery, stock of raw material, manufactured goods, etc., as well as the good will of the business, which will

hereafter be known as The Cleveland Facing Mill Co. All the well-known brands of facings, which have hitherto made this firm so well and favorably known in the past, will be manufactured, as well as some new specialties, which it is intended to introduce in the near future.

Mr. G. P. Millns is president and general manager of the new company and Mr. F. H. Chamberlin is secretary and treasurer.



W. A. JONES.

W. A. Jones.

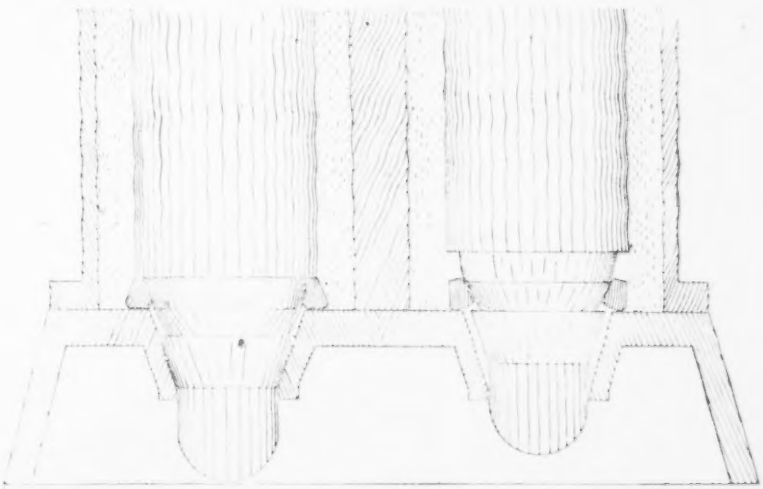
FOUNDRYMEN in the west, especially in Chicago and vicinity, are familiar with the name of the gentleman whose portrait appears herewith. One of Mr. Jones' chief characteristics noticeable, especially by those who enjoy an intimate acquaintance with him, is the energy which he brings to bear on anything he undertakes and which is largely responsible, no doubt, for the success he has achieved unaided and from the smallest beginning, even at a time when competition has been most severe.

Mr. Jones was born in Chambersburg, Pa., November 23, 1849, and is consequently 45 years old. Before he was 10 years old his parents removed to Ottawa, Ill., where what little schooling he ever received he got before he was 11, as at that time he was forced to leave school and commence the battle of life. Mr. Jones would pass anywhere as a well educated gentleman and it would therefore seem that he must have burned some midnight oil and made the most of his opportunities since. In his early youth he commenced an apprenticeship to the molding business with Mr. Wm. Stormont, the well-known foundryman at Ottawa, Ill., remaining with him

until 1870, when he went to Chicago and was in the employ of N. S. Bouton & Co., at the time of the great Chicago fire. He returned to Ottawa in 1872 and worked one season for Gamnon, Deering & Stuart, at Plano, Ill., going from there to the Sandwich Manufacturing Co., at Sandwich, Ill., where he remained one year and went to Marseilles to take charge of the foundry department of the Link-Belt Machinery Company, whose shops are among the largest and best equipped in the country. Here he remained until the summer of 1889, when he left and went into business for himself in a small way and in October of the same year took off his first heat in a row of sheds in the rear of 15 to 23 South Canal street. From the first he had in view the idea of making a specialty of machine-molded pulleys and his business has been successful from the start, so much so that in the winter of 1890 and '91 he was compelled to seek larger quarters and moved into the old Jefferson foundry, 57 and 59 South Jefferson street, where he increased his facilities from time to time, until now it is said he makes more pulleys than any foundry in Chicago or the west, having seven pulley molding machines of the latest design in operation. Mr. Jones occasionally takes a little recreation by contributing an article on some foundry subject to the trade press, and when the opportunity offers, he takes himself to some of the numerous lakes and rivers of the west where the finny tribe abounds (before he gets there, as some of his achievements as a fisherman are well-known), he being somewhat of an enthusiast on that subject and is equally fond of the gun.

The Pipe Foundry.

AMONG the many new and useful inventions that are constantly demanding the attention of the foundry public, the one in our illustration—an elastic bead for pipe patterns—deserves more than passing mention. As will be apparent from the engraving, it is used to form the bead on the small



end of the pipe, being the result of the experience of Messrs. H. Henderson, L. J. Kengott and Geo. B. Hayes, Esq., President of the Buffalo Cast Iron Pipe Co., Buffalo, N. Y., at the foundry business.

Engineers will readily see that the use of this device is an assurance of the pipe being perfectly concentric at this point, both inside and out, the absence of which has been the principal cause of the objection of pipe, which will eventually be the means of pipe made by this or similar devices getting the preference over those made in the old way.

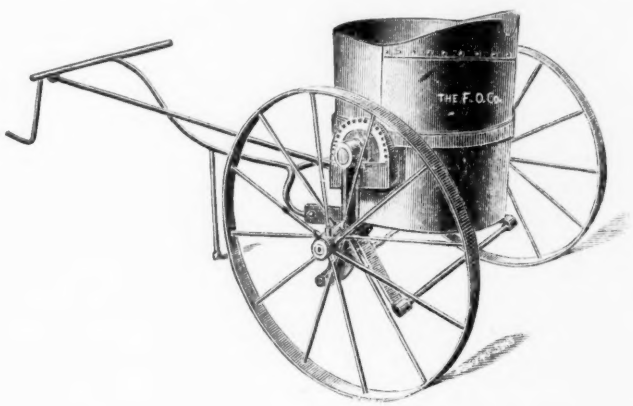
In using this pattern the pipe is rammed on the pouring seat (which is

placed on top of the blacking tank) pattern withdrawn, mold blacked and put in the oven, all with one lift of the crane, and as there are no joints, there is a certainty of no run outs. This pattern is in successful operation in a number of leading pipe foundries and has given satisfaction in every case. One of the elastic beads costs 60 cents and will last for 3,000 pipes and is not affected by the hot flasks.

Those interested desiring more information or wishing the elastic patterns on trial, will be obliged in every way possible by addressing the firm.

Sulky Ladles.

A NEW and somewhat novel article in the way of foundry appliances, illustrated in the accompanying cut and termed a sulky ladle, is being put on the market by the Foundry Outfitting Co., of Detroit, Mich.



It is adapted in particular to foundries doing a general run of light work who do not wish to adopt the overhead trolley or track method for distributing their iron. They are made in sizes with capacities up to 1,000 pounds and larger if necessary.

The ladle, as will be seen in the cut, is provided with a worm gear attachment which is operated by a crank at the handle, thus permitting the tipping of the ladle and the moving of it about the shops by one man. This style of ladle is particularly convenient in moving medium quantities of iron rapidly from the cupola to various parts of the shop.

This firm are, as will be seen from their advertising on another page, fully alive to the wants of foundrymen and their long experience in the practical branch of the business enables them to furnish equipments for the foundry that can be relied upon.

Subscribe for THE FOUNDRY. Each number is larger and better than the one previous. Only $1 per year.

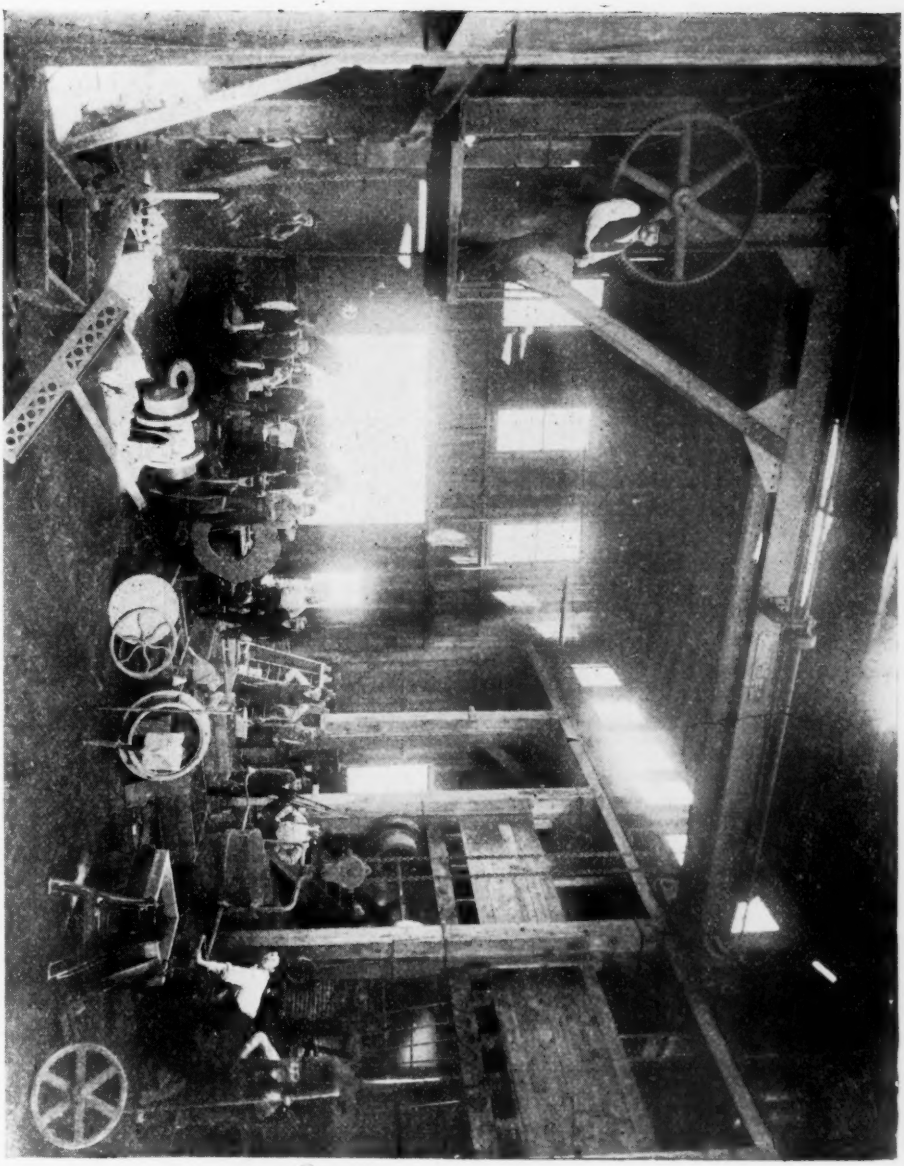
Excelsior Core Compound.

The Hollingworth Bros., of Covington, Ky., proprietors of the Excelsior Facing Mills, began the manufacture of their Excelsior Core Compound as early as 1883. It being about the first compound for cores placed on the market, the Hollingworth Bros. may be said to be among the pioneers in that class of material. That it has given universal satisfaction is evidenced by the testimonials to hand, some of which cover a continuous period of 8 years.

They have located at Covington, Ky., (across the river from Cincinnati), one of the finest and best equipped facing mills in the country, and their location enables them to secure all of the best grades of mineral that are now being mined in the southern states at favorable freight rates. Their location in the geographical center of the iron district in this country, enables them to fill orders promptly and with the minumun amount of transportation charges.

Their advertisement will be found on page 8, of this issue.

With the Millet Core Oven Co., of Brightwood, Mass., business appears to be satisfactory in every way. They report a rapidly increasing demand for their portable core ovens, and have recently shipped two of them to Switzerland and also one to the same place for special cores. Foundrymen are rapidly realizing the fact that it is cheaper to buy ovens that will give satisfaction than to lose time and worry over those of their own construction.



The Phoenix Iron Works.

THE Phœnix Iron Works Co., of Cleveland, O., have been among the busiest during the recent depression. The tariff has had no terrors for them. They are, however, glad that Grover and the gang have stopped their fooling.

The accompanying cut shows the interior of the plant of Newport Iron & Brass Foundry Co., at Newport, Ky., which is equipped with one of their four ton hand-power traveling cranes. This style of crane is becoming very popular with foundrymen on account of its adaptability to both light and heavy work, and the ease and rapidity with which it is operated. It is easily put in operation in shops already built, as it requires no heavy foundations that would necessitate tearing down the building to get in. It is made in sizes to suit any service that hand power can be applied to.

Pittsburg and Vicinity.

The Trade Outlook.

(*Special to* THE FOUNDRY.)

MARKET conditions are much the same everywhere. In this vicinity a little more business is being done, but this is limited to pressing requirements. Contracts which have been hanging for some months are just now being closed, showing that more confidence is being placed and that the tariff bill will not have near as much bad effect as at first thought. Business is of a much larger volume than for months past, and some founders state that their plants are running day and night and have enough contracts to run them for three months to come.

The coal miners' difficulties are now pretty well adjusted, while freight rates are thought to be stationary, and may be permanent during the fall.

In many cases consumers seem sure that even with a material improvement in the volume of trade, prices will range about where they are with a few exceptions. The following table shows the prices of the different grades of foundry irons:

No. 1 Foundry,	$12.00@12.50	cash.
2 "	11.00@11.50	
1 Charcoal f'dry,	17.00@17.50	
2 " "	16.00@16.50	

During the latter part of August quite a fair demand sprung up for Nos. 1 and 2 foundry iron, which was the means of stiffening up the prices, and which are still being held firmly.

The Baker Forge Co., of Elwood City, has completed its new plant and will soon have it in full operation.

The Lincoln Foundry and Machine Co. has given Wm. Swindell & Bros., of this city, the contract for the complete furnace equipment. This will consist of air and brass furnaces, core ovens and annealing furnaces.

The Derwent Foundry Co., of Ellwood City, is now operating its plant better than for some time past. An additional number of molders have been put to work during the past few weeks.

Wm. Swindell & Bros. have just completed the new steel foundry for the New York Frog and Switch Co., of Hoboken, including a one-ton open-hearth, annealing furnaces, core ovens, etc.

The Arsenal Foundry Co., which recently succeeded to the business of the Globe Foundry Co., is running its plant to full capacity, while the outlook for continuing so is very good.

The Pittsburg Foundry Co., Ltd., whose plant in Millvale was destroyed by fire some few months ago, now occupies the plant formerly used by the Morris & Bailey Steel Co., and have thoroughly equipped it with all modern conveniences.

The Porter Foundry and Machine Co., of Allegheny, has put in a 50-h. p. engine of its own design in its own plant. The workings of the engine are all on the exterior in plain view, and are simple in construction. It is a very smooth running engine and replaced one which had been in service for 28 years.

The new plant of the Lincoln Foundry and Machine Co. is being pushed rapidly toward completion. The steel frame work is now being done, and as soon as this is finished, the machinery will be put in place.

Recent contracts received by the Leichburg Foundry and Machine Co. include the entire equipment of the new tin plate plant for the Morton Tin Plate Co., of Cambridge, O. The order calls for 4 hot mills, 24″x32″, 3 cold mills 20″x32″, 3 36″ doubling shears with engine attached, and 2 36″ improved squaring shears, with automatic clutch, also a Mesta patent pickling machine and an improved valve for Wallace, Banfield & Co., of Irondale, O.

The Chicago Letter.

(*Special to* THE FOUNDRY.)

THE situation here does not bear out the various trade paper reports of a general revival in the foundry business. There is an improvement, it is true, but a careful inspection of the foundries will reveal the fact that it is only those with a specialty that are picking up. The jobbing shops are

very little, if any, busier. The settlement of the tariff question will have little effect on business further than establishing a fixed policy. What the Sherman bill was to the silver question, so the Gorman bill is to the tariff—a compromise measure which was passed, not because the country needed legislation on the subject, but to satisfy party promises. The bill does not satisfy either the Democratic party or the country at large, therefore the opinion that its passage will do little towards causing a revival of business.

The F. M. Hicks Co. has made an assignment and S. O. Cavette is the assignee.

The Wells, French Co., whose two foundries were destroyed by fire, have leased the Grant Locomotive Works and will carry on their business at that point.

Frank C. Vierling has filed a bill in the Circuit Court asking for a receiver for the corporation of Vierling, McDowell & Co., and also for an accounting. The suit arises out of an old business dispute between the complainant and his brothers, Robert and Louis Vierling, which has been in the courts for some years.

Mr. Chas. Haldeman, foreman of A. Bolter & Son, has been laid up with the rheumatism for some time, but he is now convalescent.

The estate of E. T. Harris & Co., founders and finishers, on the 16th of August, did transfer all its property, real estate and personal, to the undersigned assignee for the benefit of its creditors. All persons having claims against said company are notified to present them within three months from date to WALTER HILL, ASSIGNEE.
531 W. Fifteen Street.

J. J. Ryan, 72 and 74 W. Monroe street, brass founders and furnishers, report business improving.

Holmes & Pyott have the contract for the architectural iron work ior the new warehouse at 16th and Arthur, Felix & Marsten, proprietors.

Hansel Elcock & Co., have received contract for the architectsral iron work for the new warehouse to be erected by the Chicago Dock Co.

A. Bolter & Son have the contract for the ironwork for a large tobacco warehouse.

Wier & Craig are doing considerable work for the Tappin Steam Pump Co. and are quite busy.

Butler street foundry report an improvement.

E. A. Delano, 53 South Jefferson street, from whom W. A. Jones rents his power, burned out the night of the 3rd, which forced W. A. Jones to shut down. H. S. V.

Our Question Box.

Brass Mixturers for Condenser Heads.

G. S. W., St. John, N. B.—The mixtures for condenser heads vary with the service. For ordinary steam purposes mixtures approximating 10% tin, 90% copper on the one hand to 12% tin in 88 copper on the other are used; also from 7.5 to 10% aluminum bronze for condensing or distilling in which acids are used; 88 copper 12 tin, the latter containing from 2 to 3% of phosphorus.

PEELING BRASS CASTINGS.

G. B. M. D., Jefferson, Texas.—Your trouble probably arises from the fact that there is too much silica and not enough alumina or clay in your sand. Too large a proportion of the former in the sand will prevent the casting peeling, for the metal in melting the silica in the sand causes it to form a crust and adhere to it. Use from 5 to 7½% of lead in your metal to peel the castings, unless it is a deoxidized metal, in which case beam dust collected from the beams in foundries, charcoal, plumbago, talc, etc., will peel them. Write our advertisers.

THE WEIGHTS OF PIG IRON IN THE PILE.

"Architect," St. Louis, Mo.—A cupic foot of pig iron in the pile would weigh or average from 350 to 375 pounds according to the way it is piled. There are firms who invoice the amount of pig on hand on a basis of 325 and 375 pounds to the cubic foot in the pile according to its kind. National Lake

Superior irons will pile closer than Sloss or Bay View, so also will Salisbury, and in order to form an accurate estimate it is best to pile the pig in the form of a cube on the scales and weigh it and then calculate the weight per square foot. This we believe should be done with each kind of pig to get accurate results. In piling pig iron on foundation piles, they should be bound or crossed each time. It is also important that they should lay as evenly as possible and not have any center bearings or thick pigs in the middle to cause the mass to rock, especially at the bottom.

MEDALS.

D. S. K., Troy, N. Y.—A mixture of half tin and antimony should make solid castings. There is no reason for the metal not laying to the mold, unless the latter is too damp, and we believe this to be the cause of your trouble. Plaster molds are the same as any other mold if they are wet—the casting will likely show blow holes. They should be dry before casting and the dryer the better. The process of air drying can be hastened by adding about 5% of finely-sifted unslacked lime thoroughly mixed in the dry state. Benzine and turpentine used separately will also hasten the drying process. Take tin 3 parts, antimony 3 parts and 4 parts of a mixture of 2½ parts lead to 7½ aluminum. Approximate mixtures of this will produce satisfactory medals.

ALUMINUM.

J. D. B., Spuyten Duyvil, N. Y.—We know of nothing that will increase the fluidity of aluminum except probably the baser metals, as tin, zinc and lead; these latter, however, from their oxidizing qualities, would impart more or less of an oxidizing nature to whatever they are mixed with and for this reason would not be desirable for the class of work you are making. The Cowles Electric Smelting and Aluminum Co., have a special casting brand of aluminum which is fluid enough for any class of work.

MIXING ALUMINUM BRONZE.

J. G. W., Memphis, Tenn.—The difficulty in mixing aluminum with copper does not arise, as you say, from an absence of affinity, but rather more from the fact that the difference in weight or sp. gr. of the two is so great. Other things being equal, the tendency in mixing a light and heavy metal is for the former to rise to the surface. The process is accelerated more or less in proportion to the heat or fluidity of the heavier metal, consequently the most opportune moment for the introduction of the aluminum into the copper is at or slightly above the "mushy" point of fluidity of the latter. Better results will be obtained by introducing the aluminum into the copper in the same manner as is customary with phosphorus.

Odd Fellows at Lookout Mountain.

On September 17th, the Sovereign Grand Lodge convenes at Lookout Mountain.

The Queen & Crescent Route (Cincinnati Southern) will sell tickets at greatly reduced rates, affording a fine opportunity to visit the many points of interest around historic old Lookout.

Ask any agent for particulars, or address

R. H. Garratt, A. G. P. A., New Orleans.
I. Hardy, A. G. P. A., Vicksburg, Miss.
S. C. Ray, T. P. A., - - Dallas, Tex.
A. J. Lytle, D. P. A., - Chattanooga.
J. R. McGregor, T. P. A., Birmingham.
W. A. Beckler, N. P. A., Chicago, Ill.
C. A. Baird, T. P. A., - Detroit, Mich.
W. P. Cooley, T. P. A., Pittsburg, Pa.
Chas. W. Zell, D. P. A., Cincinnati, O.
A. Whedon, P. & T. A., Louisville, Ky.
W. C. Rinearson, G. P. A., Cincinnati.

The Worthington Hydraulic Works, of Brooklyn, N. Y., have decided to make large additions to their already extensive plant, and have placed the contract for this work with the Berlin Iron Bridge Co., of East Berlin, Conn.

We have abundant evidence of the fact that the Buffalo Forge Co., Buffalo, N. Y., have had to run their works full time in order to keep pace with their orders. They are evidently putting in quite a large number of their ventilating apparatus, as we notice quite a number of foundries on their list.

The Way We Do It.

WHEN "The Foundry's" gone to press
And the wrappers are addressed
And the sample copies are all sent away;
Than we, sit down and figure
The next one to make much bigger
And better than the last in every way.

Personal.

Mr. S. T. Johnston, general agent of the Whiting Foundry Outfitting Co., visited this office recently while in the city on business.

Mr. J. W. Paxson, of the firm of J. W. Paxson & Co., Philadelphia, Pa., sailed August 29 on the City of Paris for Europe, where he will make an extended visit through the principal business centers.

Mr. Benjamin Gomersall, of Brown & Sharp, Providence, R. I., gave us a call recently, while in the city. Mr. Gomersall came to Detroit on business connected with the prospective new foundry to be built for Leland, Faulkner & Norton, this fall.

The Berlin Iron Bridge Co., of East Berlin, Conn., havo received the contract for the new plant of the Fairfield Copper Co., at Monroe, Conn. The plant will be entirely of iron and steel, no woodwork being used about the construction.

NOTICE.

Advertisements inserted under this head for 25 Cents a line each insertion.

WANTED—If you are in need of the services of a first class brass molder, capable of taking charge of your foundry, address C. E., No. 18 Mechanic Street, New Haven, Conn.

WANTED—First-class loam molder for heavy marine engine work; must be able to get up rigging from drawings and take care of the job throughout. Address giving reference, S. J. W., this office.

WANTED—Foreman for foundry making cast iron water pipe; must understand the business in all its details and be able to handle me economically. Give experience and reference. Address W. F. L., care this office.

FOUNDRY FOR RENT—Fully equipped, new, well advertised; good location and the only one in a rich Western state is offered at a very moderate rental; a rare chance for a party wishing to engage in the stove and general foundry business. Address W. S., care this office.

ANYONE IN NEED of the services of an experienced foundryman with an A1 record of 25 years on malleable, stove plate and light machinery, can secure the same by addressing F. O. G., 1095 Payne avenue, Cleveland, O.

Their Name Means--Pig Iron.

BY the expenditure of vast stores of energy the most rigid adherence to a business in all its details and untiring perseverance along well-defined lines, the world has seen certain men or associations of men build up for themselves such reputations as have become household words the world over.

For instance, we know that Rogers' cutlery stands for perfection; that Russian iron and Damascus steel mean the highest type of excellence. We read in this country of such men as Girard, Astor, Vanderbilt, Childs, Carnegie, etc., and our mind wanders immediately to certain enterprises with which they have been connected and with which their names are inseparably affiliated.

Similarly the foundryman thinks of pig iron when he reads or hears of Rogers, Brown & Company or their affiliated interests with head offices in half a dozen American cities, and justly so, because of the extent of territory covered and the variety of grades of that great product successfully handled.

They claim to be able to supply all grades of iron needed for any particular line of work in any market in America, and judging from their advertisement appearing elsewhere in this issue, we do not imagine the claim to be an extravagant one.

New Foundry Enterprises.

The Manchester (O.) Stove Co. has been incorporated with a capital of $15,000.

There is talk of erecting a foundry and machine shop at Jackson, Tenn. The secretary of the board of trade can give information.

There is talk of a stove foundry being built at Waco, Tex. J. C. Kayes, of Evansville, is interested.

The Birmingham (Conn.) Iron Foundry has contracted for an addition 168′ by 74′ to its plant.

The Wire Fence Supply Co., Indianapolis, Ind., will this week let the contract for a brick building 90′x50′ for a foundry.

A foundry will soon be started in Churubusco, Ind.

Ferguson & Holcomb have started a foundry at Coral, Mich.

The Michigan Furnace and Stove Co., of Edwardsville, Mich., will build an addition 20x60 feet to their foundry.

Anderson Bros., foundrymen at Jeffersonville, Ind., have decided to enlarge their plant by adding another story to it.

Richland Center, Wis., has secured the addition of a foundry and machine shop to her industrial interests.

Fraser & Chalmers are preparing to construct and maintain a repair shop in Old Mexico for the convenience of their customers in that country.

A new foundry for manufacturing stove and jobbing castings is being erected at Johnstown, Pa., by the firm of Wilt & Anderson.

Andrew Howard & Co. will establish a foundry and machine shop at Bartow, Fla., with special reference to supplying the wants of phosphate miners.

Ford & Donnelly of Kokomo, Ind., encouraged by the large amount of work done at their foundry and machine shops, have decided to erect a branch foundry at Montpelier, Ind.

The Lima Machine Works, at Lima, O., have purchased the plant of the Lima Steel Casting Co., which was lately destroyed by fire, and intend to rebuild the shops.

The Fulton Truck and Foundry Co. have begun work in their new plant st Mansfield, O. The machine shop is of brick, 60x175 feet, and the foundry, not yet built, will be 100x225 feet. The company manufacture steel tired railway wheels and specialties.

The Gates Iron Works, Chicago, announces that it has leased for 50 years a tract of 180x450 feet at Hawthorne avenue and Willow street, Chicago, on which it will erect an extensive brick and steel machine shop covering the entire leasehold. In addition, the company has secured a lease of adjoining property, the improvements on which will be remodeled and refitted to suit the needs of the lessees. The new works will have direct shipping facilities by both lake and rail.

Mr. W. F. Vilas, the well-known agricultural implement manufacturer, of East Farnham, Man., is building a large new foundry at Cowansville.

Workmen are erecting an addition to the molding shop in the Lowell (Mass.) Machine shop yard. The new building will be a wooden one and is situated on the bank of the canal.

The Pittsburg Architectural Iron Works, Incorporated, have begun the erection of a new plant at Canonsburg, Pa., which will occupy about seven acres of grouud. The plant will consist of a bridge and construction shop, 175x360 feet in size; general foundry, 75x160 feet; blacksmith shop and boiler house, 40x100 feet, and pattern and store house, 40x100 feet.

Air Hoists.

THE use of compressed air, as its value and economy become appreciated, is largely on the increase. Many shops and fouudries in the last few years have put in air compressors and find many places where this power can be used to good advantage in various ways. Among these, quick hoist occupies an important place. Air hoists have been in use for a number of years, but it has remained for the Acme Hoist Co., of this city, to place upon the market an air hoist with a valve which, readers of our advertising columns will find, has special features to commend it to users of compressed air. The concern is new, and the fact that they already have had second and third orders from such firms as Jones & Laughlin, Brooks Locomotive Works, The Shiffler Bridge Co., and others, would indicate merit in their machines.

The Moore Foundry and Machine Co., of Milwaukee, Wis., have overhauled their foundry, adding a No. 5 Whiting cupola to their equipment.

The Clinton Iron Works, of Clinton, Ia., have placed a Whiting cupola in their foundry.